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VOLUME 9, NUMBER 22
NOVEMBER 15, 1976

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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 9, NUMBER 22
NOVEMBER 15, 1976

W76-11626 -- W76-12150

The Secretary of the U.S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the Bio-Science Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

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03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
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06 WATER RESOURCES PLANNING
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07 RESOURCES DATA
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08 ENGINEERING WORKS
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SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

MANUAL FOR ESTIMATING FLOOD CHARACTERISTICS OF NATURAL-FLOW STREAMS IN COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2E.
W76-11672

EFFECT OF ATMOSPHERIC STABILITY ON WATER TEMPERATURE PREDICTIONS FOR A THERMALLY LOADED STREAM,
Pennsylvania State Univ., University Park. School of Forest.
For primary bibliographic entry see Field 5B.
W76-11690

THE HYPSOMETRIC INTEGRAL AND LOW STREAMFLOW IN TWO PENNSYLVANIA PROVINCES,
Brooklyn Coll., N. Y. Dept. of Geology.
S. J. Kowall.
Water Resources Research, Vol. 12, No. 3, p 497-502, June 1976. 5 fig, 4 tab, 30 ref.

Descriptors: *Hypsometric analysis, *Streamflow, *Flow rates, *Pennsylvania, *Appalachian Mountain region, Low flow, Base flow, Shales, Recession curves, Hydrology, Watersheds(Basins), Lithologic logs, Summer, Sandstones.
Identifiers: *Hypsometric integral, Siltstones, Mountain basins, Plateau basins.

Summer streamflow duration and base flow recession curves for eight watersheds draining sandstone-siltstone-shale terranes in the Appalachian Plateau and Folded Appalachian Mountains of Pennsylvania reflect variations in areal distribution and state of structural deformation of shallower lithologic units. The hypsometric integral (HI) has been used as a rapid reconnaissance technique to evaluate hydrology characteristics and to quantify the effects of lithology and structural deformation on low streamflow. The HI provides a measure of the areal extent of sandstone in each watershed, and the magnitude of summer streamflow (sq ft/s/sq mi) increases as the value of the integral increased, to indicate a higher percent of sandstone. Streamflow duration data from the two provinces showed that siltstone-shale areas in the mountain province can produce as much low streamflow per unit area as sandstone areas in the plateau province. Short-term, summer studies of low streamflow characteristics are good measures of long-term, low streamflow characteristics. Thus it is possible to evaluate water resources with shorter surveys at reduced expenses. (Roberts - ISWS)
W76-11743

THE ARCTIC AND THE ANTARCTIC.
For primary bibliographic entry see Field 2C.
W76-11768

INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES.
For primary bibliographic entry see Field 2H.
W76-11847

PEAK FLOW INTER-ARRIVAL TIMES,
Bristol Univ. (England). Dept. of Geography.
M. G. Anderson.
Journal of Hydrology, Vol. 30, No. 1/2, p 105-112, May 1976. 3 fig, 2 tab, 8 ref.

Descriptors: *Hydrology, *Streamflow, *Peak discharge, *Stochastic processes, *Simulation analysis, *Flow characteristics, *Model studies, Flood routing, On-site investigations, Inflow.
Identifiers: *Erlang distribution, *Inter-arrival time, *Snowy Mountains Region(Australia), Sinuosity.

The use of Erlang distribution for modelling inter-arrival times between flow peaks was proposed. Application to empirical data revealed that distributions so modelled change downstream, and that such modification can be accounted for by channel sinuosity and inflow. (Terstriep - ISWS)
W76-11859

A POINT ENERGY AND MASS BALANCE MODEL OF A SNOW COVER,
National Weather Service, Silver Spring, Md. Office of Hydrology.
For primary bibliographic entry see Field 2C.
W76-11864

TURBULENT ENTRAINMENT AT THE DENSITY INTERFACE OF A TWO-LAYER STABLY STRATIFIED FLUID SYSTEM,
Johns Hopkins Univ., Baltimore, Md., Dept. of Earth and Planetary Science.
For primary bibliographic entry see Field 2L.
W76-11871

HYDROMETEOROLOGY OF HEAVY RAINSTORMS IN CHICAGO AND NORTHEASTERN ILLINOIS, PHASE I - HISTORICAL STUDIES,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W76-11875

A MODEL OF PATCHINESS FOR PREY-PREDATOR PLANKTON POPULATIONS,
Liege Univ. (Belgium) Institut of Mathematique.
For primary bibliographic entry see Field 5C.
W76-11878

2B. Precipitation

EFFECT OF ATMOSPHERIC STABILITY ON WATER TEMPERATURE PREDICTIONS FOR A THERMALLY LOADED STREAM,
Pennsylvania State Univ., University Park. School of Forest.
For primary bibliographic entry see Field 5B.
W76-11690

A HYPOTHESIS FOR URBAN RAINFALL ANOMALIES,
Illinois State Water Survey, Urbana.
S. A. Changnon, Jr., R. G. Semonin, and F. A. Huff.
Journal of Applied Meteorology, Vol. 15, No. 6, p 544-560, June 1976. 22 fig, 41 ref. NSF AEN73-07796, ERDA AT(11-1)-1199.

Descriptors: *Rainfall, *Rainfall disposition, *Cities, *Missouri, Precipitation(Atmospheric), Rainfall intensity, Excessive precipitation, Urbanization, Industries, Air pollution, Weather modification, Storms, Rain, Meteorology.
Identifiers: *METROMEX, *St. Louis(Mo), Urban effects.

METROMEX was the first major field program aimed at studying the reality and causes of urban rainfall anomalies suggested in several climatological studies. The results from the 1971-74 METROMEX data portray statistically significant increases in summer rainfall, heavy (greater than 2.5 cm) rainstorms, thunderstorms and hail in and just east (downstorm) of St. Louis. Examination of the rainfall yield of individual showers (cells), the spatial distribution of echo (rain) developments, and areal distribution of afternoon rain clearly point to the urban-industrial complex as the site for the favored initiation of the rain process under certain conditions. The greater frequency of rain initiations over the urban and industrial areas appear to be tied to three urban-related factors including thermodynamic effects leading to more clouds and greater incloud instability, mechanical and thermodynamic effects that produce confluence zones where clouds initiate, and enhancement of the coalescence process due to giant nuclei. Case studies reveal that once additional cells are produced, nature, coupled with the increased likelihood for merger with more storms per unit area, takes over and produces heavier rainfalls. Hence, the city is a focal point for both rain initiation and rain enhancement under conditions when rain is likely. (Sims - ISWS)
W76-11744

THE DEGREE OF COMMON ORIENTATION OF HYDROMETEORS OBSERVED BY POLARIZATION DIVERSITY RADARS,
National Research Council of Canada, Ottawa (Ontario).
A. Hendry, G. C. McCormick, and B. L. Barge.
Journal of Applied Meteorology, Vol. 15, No. 6, p 633-640, June 1976. 6 fig, 3 tab, 15 ref, 1 append.

Descriptors: *Precipitation(Atmospheric), *Radar, *Rain, *Hail, Instrumentation, Investigations, Raindrops, Ice, Remote sensing, Electrical engineering, Meteorology.
Identifiers: *Hydrometeors, *Orientation of hydrometeors, Precipitation particles.

Measurements were presented of the extent to which a common alignment of hydrometeors exists in various forms of precipitation. The observations, obtained with circularly-polarized radars situated at Penhold, Alberta, and Ottawa, Ontario, were made at wavelengths of 10.4 and 1.82 cm respectively. Good agreement between results obtained at these two wavelengths was found for observations made on similar classes of precipitation. The degree of preferred alignment was high (typically 75%) in moderate or heavy rain; the presence of ice-phase hydrometeors was usually associated with a low degree of orientation. The degree of orientation, in conjunction with other parameters, was useful for the identification of the precipitation particles. Limitations on its usefulness imposed by propagation effects and by multiple scattering were discussed briefly. (Sims - ISWS)
W76-11745

PRACTICAL APPLICATIONS OF SPACE SYSTEMS.
National Research Council, Washington, D. C. Space Applications Board.
For primary bibliographic entry see Field 4A.
W76-11756

OBSERVATIONS IN HAILSTORMS USING THE T-28 AIRCRAFT SYSTEM,
South Dakota School of Mines and Technology, Rapid City. Inst. of Atmospheric Sciences.
W. R. Sand.
Journal of Applied Meteorology, Vol. 15, No. 6, p 641-650, June 1976. 5 fig, 1 tab, 33 ref. NSF C-460, NCAR 182-71.

Descriptors: *Thunderstorms, *Aircraft, *Radar, Hail, Precipitation(Atmospheric), Rainfall, Lightning, Turbulence, Storms, Particle size, Cloud physics, Meteorology.
Identifiers: *Hailstorms, Liquid water content, Updrafts, Aircraft icing.

This study related data gathered during the penetration of hailstorms between 4.9 and 6.7 km MSL by an armored T-28 aircraft to detailed radar data of the hailstorms penetrated. These data recorded by the T-28 data system were combined

with observations made by the author while piloting the T-28 through hailstorms. The radar data from the National Hail Research Experiment CPR-2 were specially prepared as Constant Altitude Plan Position Indicator (CAPPI) displays and vertical sections along the aircraft track for comparison with the data gathered by the aircraft system and pilot's observations. The results indicated that significant updrafts are frequently found well ahead of the high radar reflectivity zones. The updrafts were found to be relatively smooth while the high radar reflectivity zones were found to be very turbulent. Significant quantities of supercooled liquid water were found in the updraft regions. Significant airframe icing was found in the strong updrafts with the most severe icing along the edges of the updrafts. The high reflectivity zones were found to contain almost exclusively ice. Hail was more frequently found in the area of strong reflectivity, but small hail was found outside the 40 dBZ contour. (Sims - ISWS)
W76-11851

A COMPARISON OF PHOSPHORUS AND WATER CONTRIBUTIONS BY SNOWFALL AND RAIN IN NORTHEAST OHIO,
Kent State Univ., Ohio. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W76-11858

ANALYSIS OF HYDROLOGIC RESPONSE TO RAIN-ON-SNOW,
Cold Regions Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 2C.
W76-11866

PROJECT SKYWATER, A PROGRAM OF RESEARCH IN PRECIPITATION MANAGEMENT, VOLUME I OF II (DRAFT ENVIRONMENTAL STATEMENT).
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 3B.
W76-11868

PROJECT SKYWATER, A PROGRAM OF RESEARCH IN PRECIPITATION MANAGEMENT, VOLUME II OF II (DRAFT ENVIRONMENTAL STATEMENT).
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 3B.
W76-11869

HYDROMETEOROLOGY OF HEAVY RAINSTORMS IN CHICAGO AND NORTHEASTERN ILLINOIS, PHASE I - HISTORICAL STUDIES,
Illinois State Water Survey, Urbana.
F. A. Huff, and J. L. Vogel.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-257 062, $4.50 in paper copy, $3.00 in microfiche. ISWS Report of Investigation 82, 1976. 63 p, 22 fig, 18 tab, 30 ref. NSF ENV76-01447.

Descriptors: *Rainfall, *Excessive precipitation, *Cities, *Illinois, Precipitation(Atmospheric), Rainfall disposition, Rainfall intensity, Hydrology, Urban hydrology, Climatology, Meteorology, Storms, Floods, Storm water, Storm runoff, Weather, Depth-area curves, Depth-area-duration analysis, Structures, Hydraulic structures.
Identifiers: *Northeastern Illinois, *Chicago(Ill).

This report presents the results of an investigation of heavy rainstorms in the Chicago urban area and the surrounding six counties, based on available historical data of rainfall and associated weather conditions. The counties are Cook, Du Page, Kane, Will, Lake, and McHenry. Frequency distributions of point rainfall are presented for rain periods from 5 minutes to 72 hours and recurrence intervals of 6 months to 50 years. Also presented are the relationship between point and areal mean rainfall frequencies, time and space distribution characteristics of heavy rains, orientation and movement of storms, the frequency distribution of storm centers, synoptic weather conditions associated with severe rainstorms, and the diurnal, monthly, and seasonal distribution of flood-producing storms. Results of this investigation are particularly useful in hydrologic design problems, such as in the design of urban storm sewer systems, but have application also in agriculture, environmental problems, and various phases of climatology and hydrometeorology. This historical study is the first phase of a comprehensive hydrometeorological research program for northeastern Illinois. The second phase will involve an extensive field and analysis program utilizing a large rain-gage network, weather radars, and other meteorological equipment to acquire the hydrometeorological knowledge needed to optimize the design and operation of sophisticated water resources systems. (Sims-ISWS)
W76-11875

2C. Snow, Ice, and Frost

INVESTIGATION AND CALCULATIONS OF ICE JAMS,
A. N. Chizhov.
Available from the National Technical Information Service, Springfield, Va 22161, as ADA-014 887, $5.50 in paper copy, $3.00 in microfiche. Cold Regions Research and Engineering Laboratory Draft Translation 473, March 1975. 106 p, 23 fig, 16 tab, 52 ref. Translated from Trudy Gosudarstvennogo Gidrologicheskogo Instituta, No. 219, 1974. 88 p.

Descriptors: *Ice jams, *Rivers, *Cold regions, Ice, Ice cover, Model studies, Ice loads, Powerplants, Electric powerplants, Hydroelectric powerplants, Dams, Tailwater, Remote sensing, Aerial photography, Hydrology.
Identifiers: *USSR.

This collection of six papers is concerned with the questions of ice jam phenomena on rivers. The articles indicate the quantitative tendencies in the formation of ice jams on the Dnestr River based on materials obtained from observations of past years, full-scale and model investigations, the results from studying the tendencies in ice jam phenomena in the tailwaters of hydroelectric power plants; plus a procedure for calculating these occurrences. The authors also expound on the experience gained in modeling the movement of slush ice beneath an ice cover and the results obtained from aerial photographing of jams occurring on rivers. (Sims-ISWS)
W76-11749

PRESSURES OF THERMAL ORIGIN EXERTED BY ICE SHEETS UPON HYDRAULIC STRUCTURES,
Laval Univ., Quebec. Lab. of Ice Mechanics.
M. Drouin, and B. Michel.
Available from the National Technical Information Service, Springfield, Va 22161, as ADA-014 938, $11.75 in paper copy, $3.00 in microfiche. Cold Regions Research and Engineering Laboratory Draft Translation 427, October 1974. 405 p, 186 fig, 21 plate, 37 tab, 112 ref, 4 append. Translated from Laval University Mechanics of Ice Laboratory Report S-23.

Descriptors: *Ice, *Thermal properties, *Hydraulic structures, Iced lakes, Structures, Laboratory tests, Model studies, Temperature, Physical properties, Ice loads, Lake ice, Rheology, Stress, Strain, Strain measurement, Snowpacks, Mechanical properties.
Identifiers: *Ice sheets.

Ice expands or contracts as a function of temperature variation. Partial or total restriction of the expansion of a sheet of ice gives rise to conditions of stress which the engineer must consider in analyzing the stability of hydraulic structures. Each has its own particular characteristics; the principle ones are the following: meteorological conditions, texture and structure of the ice, topography of banks, thickness of the ice, thickness and density of the snow covering the ice, and cracks in the ice sheet. The objective of this research was to study pressures of thermal origin exerted by an ice sheet as a function of these parameters. This study began with a bibliographic compendium of the principle theories elaborated from 1922 to 1968. The analysis and discussion of these investigations showed the complexity of the problem and the importance of determining at the start the rheological characteristics of the principle types of ice. The paper discussed, in order, thermal properties of ice, heat transfer through ice sheets, types of rises in air temperatures in the Quebec region, and rheological behavior of snow-pack ice and columnar ice deformed in simple compression. The results of these studies were used in calculations of pressures of thermal origin exerted by ice sheet restrained in one direction. Finally a discussion of the effects of biaxial conditions of restraint, of the presence of snow upon the ice, and of cracks in an ice sheet was presented. (Sims-ISWS)
W76-11750

MEASUREMENT OF LAKE ICE THICKNESS WITH A SHORT-PULSE RADAR SYSTEM,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 7B.
W76-11753

PRACTICAL APPLICATIONS OF SPACE SYSTEMS, SUPPORTING PAPER 5, INLAND WATER RESOURCES.
National Research Council, Washington, D. C. Panel on Inland Water Resources.
For primary bibliographic entry see Field 4A.
W76-11758

THE COLVILLE RIVER AND THE BEAUFORT SEA: SOME INTERACTIONS,
Louisiana State Univ., Baton Rouge. Dept. of Geography and Anthropology.
For primary bibliographic entry see Field 2L.
W76-11767

THE ARCTIC AND THE ANTARCTIC.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-A014 888, $4.50 in paper copy, $3.00 in microfiche. Cold Regions Research and Engineering Laboratory Draft Translation 474, August 1975. 70 p, 12 fig, 16 tab. Translated from Mezhduvedomstvennyi Komitet SSSR po mezhdunarodnomu gidrologichesk omu desiatiletiiu, Leningrad, Gidrometeoizdat, p 422-475, 1974.

Descriptors: *Arctic, *Antarctic, *Cold regions, Glaciers, Ice, *Water balance, Water resources, Precipitation(Atmospheric), Snowfall, Evaporation, Runoff.
Identifiers: *Greenland, *Antarctica.

This excerpt from a book on world water balance describes the arctic and antarctic water supply specifically. It describes in great detail the effect of glacier runoff, geographical and topographic characteristics, and the climatological influence on water balance in these areas. (Sims - ISWS)
W76-11768

RIVERBANK FORMS OF THE COLVILLE RIVER DELTA,
Aberdeen Univ., (Scotland), Dept. of Geography.
For primary bibliographic entry see Field 2L.
W76-11769

DESIGN FACTORS FOR RIVER ICE BOOMS ANALYZED,
A. M. Latyshenkov.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-A014 886, $3.50 in paper copy, $3.00 in microfiche. Cold Regions Research and Engineering Laboratory Draft Translation 485, September 1975. 13 p, 10 fig. Translated from Gidrotekhnicheskoe Stroitel'stvo, Vol. 15, No. 4, p 13-19, 1946.

Descriptors: *Ice, *Rivers, *Structures, Ice cover, Ships, Ice loads, Loads(Forces), Streamflow, Barriers, Cold regions, Mechanical engineering, Hydraulics.
Identifiers: *Ice booms, Ship protection, Ice pressure.

Model studies were made to determine hydraulic characteristics of structures for protecting ships wintering in rivers under conditions similar to those observed in European and Siberian rivers (ice-cover thickness up to 1.8 m and river depth to 12 m). The experiments were described in detail, and data were mathematically analyzed. Formulas and graphs for calculating the stresses as a function of ice-cover thickness, flow speed, and width and depth of the river were suggested. The ice pressure on protective booms in a stream wider than 30 m was found to increase 85-90% due to the friction between the lower ice surface and flowing water. The friction coefficient is proportional to the ratio of ice thickness to flow depth. (Sims - ISWS)
W76-11772

OBSERVATIONS IN HAILSTORMS USING THE T-28 AIRCRAFT SYSTEM,
South Dakota School of Mines and Technology, Rapid City. Inst. of Atmospheric Sciences.
For primary bibliographic entry see Field 2B.
W76-11851

THICKENING OF THE ROSS ICE SHELF AND EQUILIBRIUM STATE OF THE WEST ANTARCTIC ICE SHEET,
Nebraska Univ., Lincoln. Ross Ice Shelf Project.
R. H. Thomas.
Nature, Vol. 259, No. 5540, p 180-183, January 22, 1976. 5 fig, 29 ref.

Descriptors: *Ice, *Antarctic, *Glaciers, Strain, Strain measurement, Movement, Sheet flow, Ablation, Data processing, Analytical techniques, On-site investigations, Coasts, Continental shelf, Cold regions.
Identifiers: *Ice sheets, *Ice shelves, *Ross Ice Shelf(Antarctica), Ice accumulation.

Data from the south-east quadrant of the Ross Ice Shelf, Antarctica, indicate that near the grounding line the ice shelf is growing thicker by almost 1 m/yr. This thickening rate implies an advance of 1 km/yr of the grounding line between the West Antarctic ice sheet and the Ross Ice Shelf. It can be reconciled with independent evidence for current thinning of the West Antarctic ice sheet if the latter is a delayed response to an earlier retreat of the ice shelf grounding line. The high rates of ice shelf thickening may be due to an increase in the resistance to ice shelf movement caused by localized ice shelf grounding following isostatic uplift of the sea bed. (Sims - ISWS)
W76-11852

A COMPARISON OF PHOSPHORUS AND WATER CONTRIBUTIONS BY SNOWFALL AND RAIN IN NORTHEAST OHIO,
Kent State Univ., Ohio. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W76-11858

A POINT ENERGY AND MASS BALANCE MODEL OF A SNOW COVER,
National Weather Service, Silver Spring, Md. Office of Hydrology.
E. A. Anderson.
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. National Oceanic and Atmospheric Administration Technical Report NWS 19, February 1976. 150 p, 32 fig, 13 tab, 85 ref, 1 append.

Descriptors: *Snow cover, *Model studies, *Energy transfer, Radiation, Snowmelt, Temperature, Energy budget, Heat transfer, Mathematical models, Computer models, Snow, Ice, Water resources, Energy, Melting, Hydrology, Equations.
Identifiers: *Mass balance, *Energy exchange, Finite-difference equations, Newton-Raphson iteration technique.

A point energy and mass balance model was developed for a snow cover. The model was based on two equations. These were the snow cover energy balance equation and the equation for energy transfer within a snow cover. The snow cover was divided into finite layers. Implicit finite-difference expressions, based on the two equations, were written for each layer. This set of non-linear finite-difference equations was solved by use of the Newton-Raphson iteration technique. The model also included mathematical representations of the densification of the snow and the retention and transmission of liquid-water. The model was tested on an extensive, high-quality set of data obtained as part of a cooperative snow research project between NOAA and the Agricultural Research Service near Danville, Vermont. Six years of data were used. The comparison of observed and computed values of snow cover outflow, water-equivalent, temperature, and density, plus snow surface temperature and density was quite good. The results obtained with this energy balance model were compared to results obtained with a temperature index snow cover model. The energy balance model gave improved results. These comparisons and the energy exchange theory suggest that an energy balance model should give improved results in open areas and under extreme conditions when adequate data are available. Index snow cover models should give completely adequate results in heavily forested areas. (Sims-ISWS)
W76-11864

AN ANALYSIS OF WATER FLOW IN DRY SNOW,
Cold Regions Research and Engineering Lab., Hanover, N. H.
S. C. Colbeck.
Water Resources Research, Vol. 12, No. 3, p 523-527, June 1976. 3 fig, 1 tab, 12 ref. Army 4A161102B52E.

Descriptors: *Water supply, *Snow, Water, Advection, Water measurement, Runoff, Wetting, Temperature, Adsorption, Flow rates, Thermodynamic behavior, Flow, Grain size, Time lag, Discharge(Water), Equations.
Identifiers: *Dry snow, Ripe snow, Ice grains, Wetting front, Freeze-thaw-metamorphism.

Equations describing water movement in a dry snow cover were derived, and examples of flow through ripe, refrozen, and fresh snows were given. As the leading edge of a wave of liquid water advanced into subfreezing snow, the liquid water was the principal source of the thermal energy needed to raise the snow to its melting temperature, because advection of water is generally faster than heat conduction. There are three requirements which have to be met before the wetting front can propagate past any level. First, a volume of water per unit volume of snow has to be frozen onto the snow grains in order to supply enough latent heat to raise the snow to 0 C. Second, a volume of water per unit volume of snow has to be supplied to fill the residual water requirement, retained as an adsorbed film, and the water held immobile in the menisci between the snow grains. Third, any additional water supplied is mobile, and in principle the wetting front propagates downward at a rate determined by the rate at which water can be supplied to raise the liquid saturation to the level which corresponds to the value of water flux just above the wetting front. These requirements delay and reduce runoff following rain on dry snow. (See also W76-11866) (Roberts-ISWS)
W76-11865

ANALYSIS OF HYDROLOGIC RESPONSE TO RAIN-ON-SNOW,
Cold Regions Research and Engineering Lab., Hanover, N. H.
S. C. Colbeck.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-A013 383, $3.50 in paper copy, $3.00 in microfiche. Research Report 340, July 1975. 13 p, 5 fig, 1 tab, 11 ref, 1 append.

Descriptors: *Rainfall, *Snow, *Runoff, Snow cover, Precipitation(Atmospheric), Hydrology, Hydrologic aspects, Runoff forecasting, Snowmelt, Ice.

The equations describing water movement in a dry snow cover were derived and examples of flow through ripe, refrozen and fresh snows were given. The grain size of snow has a large effect on the timing of water discharge. Water is retained by dry snow to raise its temperature and satisfy the irreducible water saturation. These requirements delay and reduce runoff following rain on dry snow. (See also W76-11865) (Sims-ISWS)
W76-11866

CHARACTERISTICS OF THE FORECAST OF THE DATES OF ICE APPEARANCE IN THE LENA RIVER, OF THEIR PROBABILITY DISTRIBUTION, AND OF THE FREEZE-UP REGIME,
K. N. Polyakova.
Soviet Hydrology, Selected Papers, No. 6, p 371-377, 1974. 3 fig, 3 tab, 5 ref. Translated from Transactions of the Hydrometeorological Center of the USSR (Trudy GMRs), No. 117, p 64-73, 1974.

Descriptors: *Ice, *Rivers, *Forecasting, Model studies, Heat transfer, Freezing, Permafrost, Cold regions, Air temperature, Water temperature, Energy dissipation, Energy loss, Streamflow, Meteorology, Probability, Distribution.
Identifiers: *USSR, *Lena River(USSR).

Ice begins to form in the Lena, as in other rivers, when the water temperature nears 0 C. As a rule, grease ice appears first. If the water temperature reaches 0 C and supercools further, underwater ice crystals accumulate in windy weather or in reaches with a faster current and form so-called slush. A detailed analysis was performed for Kachug, Zhigalovo, Kirensk, Vitim, Olekminsk, Yakutsk, Zhugansk, and Kyusyur. For the date of appearance of floating ice, the date was taken of the steady appearance of slush, ice or slush run, and for the beginning of the freeze-up, the beginning date of the formation of a motionless ice cover. As a result of their unusual combinations, freeze-up occurs earliest in the lower course of the river in the Zhigansk-Kyusyur reach and in its upper course, in the Markovo-Kirensk reach. In both these reaches the average freeze-up dates are in late October. Downstream of Kirensk, in the Ichera-Peleduy reach, freeze-up is latest, on November 13-15 on the average. The rest of the river usually freezes up in the first 10 days of November. The duration of freeze-up formation along the river averages 28 days (October 18-November 15), i.e., it is twice as long as the propagation of initial ice formation. This is also the

result of the great difference in the duration of the ice run in various reaches of the Lena. After the freeze-up, the ice thickness increases rapidly, as much as 15-20 cm over a 10-day period, until January. In January-February ice growth averages 5-10 cm and in March, 2-7 cm over a 10-day period. Maximum ice thickness in the Upper Lena is recorded in the last 10 days of March and in the Middle Lena from April 10 to 20. In the lower reach of the Lena, ice thickness continues to increase by 3-5 cm over a 10-day period until the first half of April. The ice reaches its maximum thickness at the end of April. (Sims - ISWS)
W76-11867

AIR BUBBLER SYSTEMS TO SUPPRESS ICE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
G. D. Ashton.
Available from the National Technical Information Service, Springfield, Va 22161 as ADA-008 867, $4.00 in paper copy, $3.00 in microfiche. Special Report 210, September 1974. 35 p, 16 fig, 27 ref, 1 append. Army NCE-IA-73-108.

Descriptors: *Ice cover, *Ice breakup, *Bubbles, *Model studies, Bodies of water, Lakes, Rivers, Ice, Water temperature, Melting, Heat transfer, Circulation, Water circulation, Systems analysis.
Identifiers: *Air bubble systems, Ice prevention, Ice formation, Ice suppression.

Two-dimensional line source air bubbler systems used to induce convective melting of the undersurface of an ice cover over a water body were analyzed and a procedure was developed for predicting the effectiveness of the systems. Various field conditions were considered and limitations to the effectiveness of the systems were pointed out. Example applications of the concepts and the procedures were illustrated in the Appendix. (Sims-ISWS)
W76-11874

2D. Evaporation and Transpiration

FLOW FROM SMALL WATERSHEDS ADJACENT TO THE STUDY REACH OF THE GILA RIVER PHREATOPHYTE PROJECT, ARIZONA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2E.
W76-11677

METHODS FOR COMPUTING THE EVAPORATION OF LAKE FERTOE, (IN GERMAN),
Orszagos Meteorologiai Intezet, Budapest (Hungary). Zentralanst. Atmos. Phys.
F. Kozma, and E. Toth.
Arch Meteorol Geophys Bioklimatol Ser B Klimatol Umweltmeteorol Strahlungsforsch. 23(1/2), p 99-110, 1975.

Descriptors: Evaporation, Lakes, Europe, Methodology, Evapotranspiration, Evaporation pans, Water balance, Climates.
Identifiers: *Reed, *Lake Fertoe(Hungary).

Hydrometeorological investigations were carried out since 1969 in the Hungarian part of Lake Ferro to determine the evaporation from the water surface and of the evapotranspiration of the regions covered by reed. The results obtained by the energenic formula of Hofmann, are compared with results obtained by applying other methods of computing evaporation. A description is given of the modified Hofmann formula, and of the results obtained with it. An analysis of the data obtained with evaporation pans relating these with some components of the water balance and with some climatic elements is given. --Copyright 1975, Biological Abstracts, Inc.
W76-11741

MODEL FOR PREDICTING EVAPOTRANSPIRATION FROM NATIVE RANGELANDS IN THE NORTHERN GREAT PLAINS.
Agricultural Research Service, Boise, Idaho. Northwest Watershed Research Center.
C. L. Hanson.
Transactions of the American Society of Agricultural Engineers, Vol. 19, No. 3, p 471-481, May-June 1976. 5 fig, 4 tab, 42 ref.

Descriptors: *Evapotranspiration, *Range grasses, *Vegetation, *Model studies, *Great plains, Water, Energy budget, Soil water, Ranges, Forecasting, Estimating, Mathematical models, On-site data collections.
Identifiers: *Northern Great Plains, *Growing season, Potential evapotranspiration, Model calibration.

A study was made to develop a model for estimating evapotranspiration from Northern Great Plains native rangeland, based on potential evapotranspiration, available soil water, leaf area, and direct evaporation from the soil and intercepted water from plants. To calibrate and test the model, data from Gillette, Wyoming, Cottonwood, South Dakota, and Sidney, Montana, were collected and evaluated. An optimization routine was employed to obtain the parameter values of the model. To estimate potential evapotranspiration, an approximate energy balance method and the United States Weather Bureau Class A pan evaporation were used because the data required by them were available or easily computed. The approximate energy balance method required daily solar radiation and mean daily air temperature. Based on model verification, the energy balance equation and the pan evaporation equation could be used to predict daily as well as mean 5-, 7-, and 10-day potential evapotranspiration. Model evaluation also indicated that it was better to use the approximate energy balance method than the Class A pan method for potential evapotranspiration. The model predicted daily as well as mean evapotranspiration better in loam soil areas than in fine clay soil areas. (Roberts - ISWS)
W76-11742

EVAPOTRANSPIRATION FROM A SHORT-GRASS PRAIRIE SUBJECTED TO WATER AND NITROGEN TREATMENTS,
Colorado State Univ., Fort Collins. Natural Resource Ecology Lab.
W. K. Lauenroth, and P. L. Sims.
Water Resources Research, Vol. 12, No. 3, p 437-442, June 1976. 8 fig, 1 tab, 18 ref. U.S. International Biological Program Grassland Biome. NSF GB-7824, GB-13096.

Descriptors: *Evapotranspiration, *Prairie soils, *Grasses, *Colorado, *Great Plains, Water, Nitrogen, Water balance, Soil-water-plant relationships, Energy budget, On-site investigations, Soil treatment.
Identifiers: *Shortgrass prairie, Soil-water potential, Ascalon sandy loam soil, Penman's method, Green needlegrass.

Evapotranspiration was estimated by the water balance method for three water and nitrogen treatments and a control in a shortgrass prairie in northeastern Colorado in 1971, 1972, and 1973. Nitrogen was applied at a rate of 150 kg/ha to maintain soil mineral nitrogen levels greater than or equal to 50 kg/ha above control levels with and without supplemental water. The water treatment maintained soil water potential greater than -0.8 bar during the growing season and was applied with and without nitrogen. Evapotranspiration for the control and unwatered nitrogen treatments was not different and ranged from 118 to 226 mm over the 3 years. The 3-year averages of evapotranspiration for the water plus nitrogen treatments were 505 and 578 mm, respectively. Evapotranspiration for the water plus nitrogen treatment agreed with potential evapotranspiration predicted by Penman's model. (Roberts-ISWS)
W76-11849

A POINT ENERGY AND MASS BALANCE MODEL OF A SNOW COVER,
National Weather Service, Silver Spring, Md. Office of Hydrology.
For primary bibliographic entry see Field 2C.
W76-11864

2E. Streamflow and Runoff

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART II. PACIFIC SLOPE BASINS IN CALIFORNIA--VOLUME I. BASINS FROM TIJUANA RIVER TO SANTA MARIA RIVER,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W76-11669

FLOOD HYDROLOGY OF BUTTE BASIN 1973 AND 1974 WATER YEARS, SACRAMENTO VALLEY, CALIFORNIA--A PROGRESS REPORT,
Geological Survey, Menlo Park, Calif.
R. G. Simpson.
Available from the National Technical Information Service, Springfield, Va 22161, as ADA-027-213, $4.50 in paper copy, $3.00 in microfiche. Water-Resources Investigation 36-75, March 1976. 53 p, 18 fig, 4 tab, 8 ref, append.

Descriptors: *Flood data, *Streamflow, *Flow rates, *Peak discharge, *Storms, Flood profiles, Hydrologic data, Data collections, Gaging stations, Stream gages, Discharge(Water), Crest-stage gages.
Identifiers: *Butte Basin(Calif), *Sacramento Valley(Calif).

Stage and discharge data are being collected at selected locations to describe the flood hydrology of Butte Basin. Flooding in the basin is caused primarily by overflow from the Sacramento River which forms the western boundary of the basin. Overflow from the Sacramento River is measured along four roads which cross the basin-Ord Ferry Road, Afton Boulevard, State Highway 162, and Gridley Road-- and at Moulton and Colusa Weirs. During the 1973 water year only minor flooding occurred near the roads, and flows were carried by existing channels. Overflow at Colusa Weir reached a peak flow of about 40,000 cfs on January 20; overflow at this weir caused most of the flooding within the lower part of Butte Basin. A peak stage of 57.5 ft was recorded in Butte Basin opposite Colusa Bypass. Two floods, one during January and the second at the end of March caused overflow to Butte Basin during the 1974 water year. Peak overflow along Ord Ferry Road was about 70,000 cfs on January 17 and was about 38,000 cfs on March 31. About half the overflow from these floods returned to the main channel before reaching Afton Boulevard. Peak flows along Afton Boulevard, State Highway 162, and Gridley Road, ranged from about 39,000 cfs to 44,000 cfs on January 18 and from about 21,000 cfs to 24,000 cfs on April 1. Peak overflows at Moulton Weir were nearly 60,000 cfs during both floods. Peak stages in Butte Basin opposite Colusa Bypass were 61.3 ft on January 19 and 60.3 ft on April 4. (Woodard-USGS)
W76-11670

MAP SHOWING SELECTED EXTREME-STREAMFLOW STATISTICS AND DRAINAGE AREAS, GREATER PITTSBURGH REGION, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 7C.
W76-11671

MANUAL FOR ESTIMATING FLOOD CHARACTERISTICS OF NATURAL-FLOW STREAMS IN COLORADO,
Geological Survey, Denver, Colo.

J. F. McCain, and R. D. Jarrett.
Colorado Water Conservation Board, Denver, Technical Manual No 1, 1976. 68 p, 12 fig, 8 tab, 33 ref.

Descriptors: *Flood forecasting, *Natural flow, *Streams, *Colorado, *Flow characteristics, Methodology, Flood recurrence interval, Flood plains, Topography, Hydrologic data, Flood frequency, Regression analysis, Rainfall-runoff relationships, *Estimating.

This manual contains methods for obtaining flood information for the 10-, 50-, 100-, and 500-year floods at sites on natural-flow streams in Colorado. The peak-discharge information is applicable to a wide variety of studies ranging from rapid approximation of flood-prone areas to detailed flood-plain studies based on precise hydraulic field measurements. Conversely, the flood-depth information is applicable only for rapid approximation of flood-prone areas or as a general guide to flood depths for comparative purposes. This limited usage of the flood-depth information results from the difficulty in evaluating field conditions, such as channel width, and size of structures, such as bridges and culverts, from exising topographic maps. The methods are described and a step-by-step procedure for applying the methods is presented with several examples. Procedures for transferring the depth information to topographic maps are also described. Other sections contain a discussion of accuracy, analytical development of the methods, and a list of flood data for gaging stations. (Woodard-USGS)
W76-11672

FLOODS OF MAY-JULY 1975, ALONG THE CONTINENTAL DIVIDE IN MONTANA,
Geological Survey, Helena, Mont.
M. V. Johnson, and R. J. Omang.
Open-file report 76-424, June 1976. 12 p, 2 fig, 1 tab, 3 ref.

Descriptors: *Floods, *Flood data, *Streamflow, *Peak discharge, *Montana, Flow rates, Flood discharge, Hydrologic data, Rainfall, Snowmelt, Rocky Mountain Region, Flood recurrence interval, Flood frequency.
Identifiers: *Continental Divide(Mont).

Extensive flooding occurred along both sides of the Continental Divide in Montana from May through July 1975. Runoff from above average snowpack at low altitudes combined with runoff from rainfall to cause floods in May. Snowmelt from high altitudes and above average rain in June caused flooding and sustained high flows into July. Federal and State agencies estimated flood damage at about $53,000,000. Peak stages, flow rates, and estimated frequencies were determined for 124 sites. Small tributaries of the upper Clark Fork and Missouri River had peak-of-record flows at many sites. The 1975 floods are hydrologically significant because many of the flood peaks approximate the 100-year flood magnitude. (Woodard-USGS)
W76-11675

FLOW FROM SMALL WATERSHEDS ADJACENT TO THE STUDY REACH OF THE GILA RIVER PHREATOPHYTE PROJECT, ARIZONA,
Geological Survey, Menlo Park, Calif.
D. E. Burkham.
Available from Supt. of Documents, GPO, Wash., D. C. 20402, Price $0.55. Professional Paper 655-I, 1976. 119 p, 8 fig, 2 plates, 3 tab, 16 ref.

Descriptors: *Storm runoff, *Streamflow, *Hydrologic budget, *Small watersheds, *Arizona, Evapotranspiration, Phreatophytes, Hydrologic data, Flow rates, Peak discharge.
Identifiers: *Gila River tributaries(Ariz).

The Gila River in Safford Valley, southeastern Arizona, was the site for a field study of evapotranspiration (Culler and others, 1970). During the period of study, 1963-71, measurements of storm runoff in summer--July through October--from tributaries along a 15-mile reach of the Gila River were required for water budget analyses. Most of the outflow from the 43 tributary basins, which range in size from about 0.1 to 20 square miles resulted from thunderstorms of small areal extent. The mean summer runoff for 1963-71 was about 1,370 acre-ft. The maximum summer runoff was about 3,180 acre-ft in 1967 and the minimum was about 130 acre-ft in 1970. The largest storm outflow was about 970 acre-ft. The largest peak discharge occurring in a tributary stream was 8,000 cubic feet per second (cfs) which came from a 14 square mile watershed. The largest peak discharge per square mile was about 2,300 cfs which resulted from a storm centering on a 0.79 square mile watershed. The tributary watersheds contributed to the project area on an average of less than 13 days per year. (Woodard-USGS)
W76-11677

SOIL SLIPS, DEBRIS FLOWS, AND RAINSTORMS IN THE SANTA MONICA MOUNTAINS AND VICINITY, SOUTHERN CALIFORNIA,
Geological Survey, Reston, Va.
R. H. Campbell.
Available from Supt. of Documents, GPO, Wash., D. C. 20402, Price $1.70. Professional Paper 851, 1975. 51 p, 36 fig, 1 tab, 54 ref.

Descriptors: *Landslides, *Soils, *Storm runoff, *California, Reviews, Evaluation, Topography, Soil properties, Slopes, Hydrologic data, Rainfall, Storms, Aerial photography, Vegetation, Soil moisture, Debris avalanches, Damages.
Identifiers: *Soil slips(Southern Calif), *Santa Monca Mountains(Calif).

On the record of the past decade, debris flows generated by soil slips during rainstorms present a greater risk of death and injury to southern California residents than all other kinds of slope failure combined. Soil slips require a combination of three conditions: (1) A mantle of colluvial soil or a wedge of colluvial ravine fill, on (2) a steep slope, where (3) soil moisture is equal to or greater than the liquid limit of the remolded colluvial soil. The most common range of slope for soil slip that give rise to destructive debris flows is from about 56 degrees to about 27 degrees. Slopes steeper than 56 degrees generally do not have a continuous mantle of colluvium; most commonly they are bare bedrock. The lowest slope on which a soil slip has been reported in coastal California is 15 degrees. With radar weather maps showing the distribution of high-intensity rainfall and slope maps showing the distribution of slopes of the most susceptible steepness, the empirical association may provide a means of recognizing areas where the hazard is greatest at any given time during a storm, and warnings to residents could be more specific and reliable. (Woodard-USGS)
W76-11680

ON THE JOINT DISTRIBUTION OF THE LARGEST FLOOD AND ITS TIME OF OCCURRENCE,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
V. K. Gupta, L. Duckstein, and R. W. Peebles.
Water Resources Research, Vol. 12, No. 2, p 295-304, April 1976. 2 fig, 1 tab, 10 ref, 3 append. OWRT B-032-ARIZ(25). NSF GK-35915 and GK-35791.

Descriptors: *Flood frequency, *Annual peak discharge, *Flood peak, *Mississippi River, Stochastic processes, Hydrograph analysis, Streamflow, Hydrology, Frequency analysis, Time of concentration, Model studies, Kentucky, Minnesota, *Distribution patterns.
Identifiers: Partial duration series, Distribution function, Exceedance, *Licking River(Ky), *St. Paul(Minn).

In a partial duration series the total number of exceedances as well as the exceedance flows is formalized as a random sequence of random variables. This formalism along with some physically reasonable assumptions leads to a rigorous expression for the joint distribution function of the largest exceedance and its time of occurrence. The deviation provides one way to consider the temporal changes in the occurrence and the magnitudes of individual exceedances due to 'seasonal' influences. This approach is general enough to be applied to any time interval of interest; furthermore, the derived expressions are exact (nonasymptotic). It may thus represent an improvement over an application of Gumbel's classical extreme value theory to flood phenomena, which is based on the premise that a large number of exceedances are available over time intervals of interest and which provides only asymptotic expressions. (Lardner-ISWS)
W76-11694

THE HYPSOMETRIC INTEGRAL AND LOW STREAMFLOW IN TWO PENNSYLVANIA PROVINCES,
Brooklyn Coll., N. Y. Dept. of Geology.
For primary bibliographic entry see Field 2A.
W76-11743

A MODEL OF TURBULENT DIFFUSION,
Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering; and Technische Hogeschool, Delft (Netherlands). Lab. of Fluid Mechanics.
C. Kranenburg.
Report No. 75-2, 1976. 43 p, 5 fig, 19 ref, 2 append.

Descriptors: *Turbulence, *Diffusion, *Hydraulics, *Model studies, *Analytical techniques, Flow characteristics, Velocity, Boundary processes, Mathematics, Equations.
Identifiers: *Homogeneous turbulence, Concentration fluctuations, Nonstationarity, Kinematic problem.

A model of particle diffusion in homogeneous turbulence was derived using an approximation concerning the trajectories of the individual fluid particles. The model equation for the mean concentration was in accordance with some exact results, e.g., those for small and large diffusion times, and Taylor's relationship. In the case of a normal velocity distribution, it predicted an almost normal distribution of the mean concentration at all diffusion times. The model was applied also to the concentration fluctuation problem. The resulting equation supported assumptions for large diffusion times found in the literature. The possible application of the model to diffusion in nonhomogenous turbulence was touched upon briefly. (Singh - ISWS)
W76-11770

TRAVEL TIMES AND NONLINEARITY OF FLOOD RUNOFF FROM TRACER MEASUREMENT ON A SMALL WATERSHED,
New South Wales Univ., Kensington (Australia), School of Civil Engineering.
D. H. Pilgram.
Water Resources Research, Vol. 12, No. 3, p 487-496, June 1976. 11 fig, 4 tab, 21 ref.

Descriptors: *Travel time, *Tracers, *Flood discharge, *Australia, Velocity, Discharge(Water), Watersheds(Basins), Radioactivity, Low flow, Rainfall, Hydrographs, Spatial distribution, Runoff, Small watersheds.
Identifiers: *Tracer measurements, *Flood magnitude, Linearity, Nonlinearity, Flood timing.

Flood runoff was traced from seven injection points to the outlet of a 96-acre watershed. Each radioactivity time record at the outlet provided a hydrograph of outflow of the labeled drop of water. The results yielded direct information on the flood process of a type and accuracy not possible from conventional analysis of rainfall and runoff records. The relationship of travel time and average velocity with discharge were examined together with the variations of these relationships over the watershed. Average travel times were shown to be similar to the watershed lag. The nature of the nonlinearity of the flood runoff process was demonstrated. Although the process was grossly nonlinear at low flows, linearity was approximated at high flows. Spatial variations of travel time and hydrograph shape were shown to make contributions to nonlinearity that were additional to the lumped dependence on flood magnitude that is normally considered. The tracing was carried out on the 96-acre Research Creek watershed near Sydney, Australia, by using the radioisotopes gold 198 and chromium 51-EDTA as tracers. The average stream and surface slopes were 7% and 10%, respectively. (Roberts-ISWS)
W76-11850

ROUGHNESS EFFECTS ON RECTANGULAR FREE OVERFALL,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W76-11855

PEAK FLOW INTER-ARRIVAL TIMES,
Bristol Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 2A.
W76-11859

WATER RESOURCES AND THEIR DEVELOPMENT IN NIGERIA,
Ibadan Univ. (Nigeria), Dept. of Geography.
For primary bibliographic entry see Field 4A.
W76-11860

TIME OF CONCENTRATION OF OVERLAND FLOW,
Nevada Univ., Reno. Center for Water Resources; and Nevada Univ., Reno. Desert Research Inst.
V. L. Gupta, and P. J. Sinclair.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY4, p 549-553, April 1976. 1 fig, 6 ref, 1 append. OWRT A-057-NEV(3).

Descriptors: *Overland flow, *Time of concentration, *Runoff, Flood flow, Land, Flow rates, Streamflow, Hydrologic cycle, Travel time, Urban drainage, Turbulent flow, Surface runoff, Velocity, Equations, Precipitation excess, Watersheds(Basins).
Identifiers: Surface roughness.

The overland flow phase of the runoff process is considered. Working equations were developed for estimating the time of concentration of overland flow in terms of rainfall excess intensity, length of flow path, Manning's roughness coefficient, and average surface slope. Flow continuity and a turbulent flow regime were assumed. The relationships developed are usable for turbulent flow regime in rural areas as well, in contrast to existing computational aids which are applicable only to restricted urban drainage situations. (Roberts-ISWS)
W76-11958

2F. Groundwater

SPRING FLOW FROM PRE-PENNSYLVANIA ROCKS IN THE SOUTHWESTERN PART OF THE NAVAJO INDIAN RESERVATION, ARIZONA,
Geological Survey, Cheyenne, Wyo.
M. E. Cooley.
Available from Sup. of Documents, GPO, Wash. D. C. 20402 Price $1.05. Professional Paper 521-F, 1976. 15 p, 3 fig, 2 plates, 3 tab, 30 ref.

Descriptors: *Spring waters, *Indian reservations, *Arizona, *New Mexico, *Utah, Groundwater resources, Aquifer characteristics, Hydrogeology, Water quality, Rivers, Inflow, Hydrologic data.
Identifiers: *Navajo Indian Reservation(Ariz), Pre-Pennsylvania rocks.

About 220 cubic feet per second (cfs) of spring flow issues from the pre-Pennsylvania rocks in the canyon of the Little Colorado River; the flow is mainly from the Redwall and Muav Limestones, which combine hydraulically to form a multiple-aquifer system. Blue Spring--the largest spring in the Colorado Plateaus physiographic province--discharges about 90 cfs from the left bank of the Little Colorado River. Blue Spring and other nearby springs maintain the perennial flow of the Little Colorado. At the present time, the use of Blue Spring and the other nearby springs for water supplies is not feasible because of (1) the poor chemical quality of the water--more than 2,000 parts per million (ppm) of dissolved solids--and (2) the amount of lift that would be required--about 2,000 feet from the channel of the Little Colorado River to the canyon rim. Water from Vaseys Paradise Spring, in Marble Canyon, contains 163 ppm of dissolved solids; the spring receives its recharge from the Kaibab Plateau, which is only a short distance from Vaseys Paradise. (Woodard-USGS)
W76-11673

GROUND-WATER LEVELS IN SELECTED BASINS IN THE STATE OF UTAH FROM FEBRUARY-MARCH 1974 TO FEBRUARY-MARCH 1975,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 7C.
W76-11678

HYDROLOGIC RECONNAISSANCE OF THE PINE VALLEY DRAINAGE BASIN, MILLARD, BEAVER, AND IRON COUNTIES, UTAH,
Geologicsl Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 4B.
W76-11683

PRELIMINARY EVALUATION OF THE GROUND-WATER DATA NETWORK IN INDIANA,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 7A.
W76-11684

PROBABLE EFFECTS OF INCREASING PUMPAGE FROM THE SCHOFIELD GROUND-WATER BODY, ISLAND OF OAHU, HAWAII,
Geological Survey, Honolulu, Hawaii.
For primary bibliographic entry see Field 4B.
W76-11686

SIMULATED EFFECTS OF THE PROPOSED NARROWS RESERVOIR ON THE WATER-TABLE AQUIFER ALONG THE SOUTH PLATTE RIVER, MORGAN COUNTY, COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W76-11687

TRANSIENT SIMULATION OF SALTWATER INTRUSION IN SOUTHEASTERN FLORIDA,
Princeton Univ., N. J. Dept. of Civil Engineering; an Princeton Univ., N. J. Water Resources Program.
For primary bibliographic entry see Field 2L.
W76-11689

WATER AND AIR MOVEMENT IN A BOUNDED DEEP HOMOGENEOUS SOIL,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 2G.
W76-11695

THE AGE OF GROUNDWATER IN THE CHALK OF THE LONDON BASIN,
Atomic Energy Research Establishment, Harwell (England).
D. B. Smith, R. A. Downing, R. A. Monkhouse, R. L. Otlet, and F. J. Pearson.
Water Resources Research, Vol. 12, No. 3, p 392-404, June 1976. 7 fig, 4 tab, 16 ref. U.S. Army 10790-EN.

Descriptors: *Radioactive dating, *Groundwater, *Groundwater basins, *Carbon radioisotopes, Groundwater movement, Pleistocene epoch, Stable isotopes, Radioisotopes, Tritium, Oxygen isotopes, Deuterium, Groundwater recharge, Sampling, On-site investigations, Bicarbonates, Carbonates, Ion exchange, Reduction(Chemical), *Age, *Dating, *Radioactive dating.
Identifiers: *London Basin(England), *Chalk aquifer, Sulfate reduction, Nitrate reduction.

Isotope techniques have been applied to a study of groundwater movement in the Chalk of the London Basin. The 'age' of the water as determined by C14 measurements increases toward the central confined part of the basin where it exceeds 25,000 years and therefore originated during the Pleistocene. The age distribution supports previous interpretations of the permeability pattern, partly based on hydrochemistry. Measurements of tritium and the stable isotope ratios of carbon, oxygen, and deuterium were also made. The C13/C12 ratio varied from -13% at outcrop to values less negative than -1% in the central part of the basin, which is approaching the value of plus 2.35% for the aquifer matrix. The 018 and deuterium ratios indicate that the Pleistocene waters were recharged at a mean air temperature less than 1 C cooler than that of present day recharge, probably because recharge in the Pleistocene was limited to summer periods because of frozen ground in the winter. (Visocky-ISWS)
W76-11848

HYDROLOGICAL STUDIES OF THE SAGINAW FORMATION IN THE LANSING, MICHIGAN AREA - 1962,
Michigan State Univ., East Lansing. Dept. of Geology.
A. Firouzian.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-242 117, $4.00 in paper copy, $3.00 in microfiche. Technical Report No. 9, December 1970. 29 p, 10 fig, 5 tab, 4 ref.

Descriptors: *Aquifers, *Piezometry, *Potentiometric level, *Michigan, Water table, Groundwater, Groundwater movement, Flow, Pumping, Drawdown, Recharge, Natural recharge, Precipitation(Atmospheric), Rivers, Hydrologic aspects, Geology, Bedrock, Geologic formations, Transmissivity, Hydrology.
Identifiers: *Saginaw formation(Mich), Lansing(Mich), *Grand River(Mich).

The purpose of this investigation was to study the hydrological characteristics of the Saginaw Formation in the Lansing, Michigan area. The water-bearing beds of sandstone in the Saginaw Formation are the principal source of water for the greater Lansing area, including the cities of Lansing and East Lansing, Michigan State University, industrial plants, and surrounding townships. The Saginaw Formation is the bedrock formation in the area and is overlain by Pleistocene glacial

deposits. The average transmissibility of the Saginaw Formation as determined by flow net analysis on the basis of 1962 piezometric map is 23,000 gallons per day per foot. The study showed that the aquifer is recharged from the Grand River at the rate of 3 million gallons per day. The average recharge from precipitation into the aquifer is estimated at 4.8 inches per year which is equivalent to 28 million gallons per day based on the recharge area of an estimated 120 square miles. The amount of water discharged by pumpage is balanced by the amount of water recharged into the area. The cone of depression should remain static if pumpage continues at the same rate. (Sims-ISWS)
W76-11870

HARRIS-GALVESTON SUBSIDENCE DISTRICT CREATED TO 'END' SUBSIDENCE,
Harris-Galveston Coastal Subsidence District, Houston, Tex.
For primary bibliographic entry see Field 4B.
W76-11919

EQUATION OF INFILTRATION WITH COMPRESSION AND COUNTERFLOW EFFECTS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W76-11956

DISTRIBUTED PARAMETER IDENTIFICATION OF GROUNDWATER SYSTEMS BY NON-LINEAR ESTIMATION,
Universidad de Los Andes, Merida (Venezuela). Dept. of Systems Engineering.
H. L. Garay, Y. Y. Haimes, and P. Das.
Journal of Hydrology, Vol. 30, No. 1/2, p 47-61, May 1976. 2 fig, 3 tab, 15 ref. OWRT B-045-OHIO(3).

Descriptors: *Aquifer systems, *Mathematical models, *Operations research, *Transmissivity, Groundwater, Least squares method, Systems analysis, Numerical analysis, Algorithms, Optimization, Aquifer characteristics, Spatial distribution, Boundary processes, Unsteady flow, Equations, On-site investigations.
Identifiers: Distributed parameters, Polynomial functions, Alternate direction implicit technique, Inverse problem, Output error, Finite-difference technique, Linearization, Sensitivity.

A method of identifying an aquifer (groundwater) system was presented. The identification problem was formulated within a static optimization framework with least-squares error norm as the objective function. The system model consists of a parabolic two-dimensional partial differential equation, with transmissivity as the model's unknown distributed parameter. The transmissivity was assumed to be a polynomial function of areal distribution over the aquifer, where the polynomial coefficients are to be estimated. An alternate direction implicit numerical technique for solving the nonlinear parabolic partial differential equation with irregular boundaries was utilized. The identification problem was solved by using Marquardt's nonlinear estimation algorithm. A case study was undertaken for the aquifer system in Dayton, Ohio, and computational results obtained from the model were compared with results from an analog simulation model. (Visocky-ISWS)
W76-11957

MANAGING SOUTH FLORIDA'S GROUNDWATER AQUIFER,
Central and Southern Florida Control District, West Palm Beach.
For primary bibliographic entry see Field 4B.
W76-12002

2G. Water In Soils

SOIL SLIPS, DEBRIS FLOWS, AND RAINSTORMS IN THE SANTA MONICA MOUNTAINS AND VICINITY, SOUTHERN CALIFORNIA,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2E.
W76-11680

WATER AND AIR MOVEMENT IN A BOUNDED DEEP HOMOGENEOUS SOIL,
Colorado State Univ., Fort Collins. Engineering Research Center.
J. Sonu, and H. J. Morel-Seytoux.
Journal of Hydrology, Vol. 29, No. 1/2, p 23-42, March 1976. 13 fig, 23 ref. OWRT B-070-COLO(17). OWRT No. 14-41-0001-3566.

Descriptors: *Soil water movement, *Infiltration rates, Pore pressure, Equations, Mathematical studies, Celerity, Velocity, Porosity, Permeability, Ponding, Rainfall, Infiltration, Saturated soils, Water table, Aquifers, On-site tests, Laboratory tests.
Identifiers: *Soil air movement, Imbibition, Boundary conditions, Saturation profile, Relative permeability, Wetting front, Soil infiltration capacity.

A methodology, based on the knowledge of the characteristic curves of the soil, was presented to predict the infiltration rate into a soil, the evolution of the water content in the soil, and the evolution of the water table under natural hydrological boundary conditions. Comparison with experimental results showed the method to be accurate. Infiltration rate curves were obtained for a number of situations involving different boundary and/or initial conditions. The results confirmed the known experimental facts and the field observations that soil-air behavior is an important factor in infiltration phenomena. (Visocky-ISWS)
W76-11695

EVALUATION OF SOIL SYSTEMS FOR LAND DISPOSAL OF INDUSTRIAL AND MUNICIPAL EFFLUENTS,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 5D.
W76-11774

EVAPOTRANSPIRATION FROM A SHORT-GRASS PRAIRIE SUBJECTED TO WATER AND NITROGEN TREATMENTS,
Colorado State Univ., Fort Collins. Natural Resource Ecology Lab.
For primary bibliographic entry see Field 2D.
W76-11849

AN ECOLOGICAL MODEL FOR HEAVY METAL CONTAMINATION OF CROPS AND GROUND WATER,
Royal Danish School of Pharmacy, Copenhagen.
For primary bibliographic entry see Field 5B.
W76-11885

THE INFLUENCE OF SOIL WATER CONTENT ON THE UPTAKE OF IONS BY ROOTS: II. CHLORIDE UPTAKE AND CONCENTRATION GRADIENTS IN SOIL,
Nottingham Univ. (England). School of Agriculture.
R. J. Dunham, and P. H. Nye.
J Appl Ecol. 11(2), p 581-595, 1974.

Descriptors: *Chlorides, *Absorption, *Soil water, *Ions, Roots, Model studies, *Onions.
Identifiers: Concentration gradients.

Uptake and concentration gradients of Cl in soil in the vicinity of a plane of onion roots were measured at a range of soil water contents. Uptake was greater at higher water contents, and the zones of depletion in the soil spread further from the roots. A relatively simple theoretical model of ion transport to roots accounted for the trends among the measured concentration gradients - including an accumulation of Cl at the root surface in 1 case where transpiration was comparatively high. A more detailed model which took account of the water content changes observed during the uptake period satisfactorily reproduced the general shape of the measured gradients, but tended to underestimate the spread of the depletion zones. A possible reason for this was that hydrodynamic dispersion by the water flux to the roots increased the effective diffusion coefficient of Cl thus increased the spread. Although, ideally, the root absorbing power used in the model should have been continuously adjusted to take into account Cl concentration and matric potential changes at the root surface, the values which gave the concentration gradients that fitted most closely to the measured gradients, agreed well with the root absorbing powers calculated from the measured uptake. At higher soil water contents these values of the root absorbing power also agreed with those obtained for onion seedlings growing in stirred nutrient solution. At lower soil water contents, however, when the matric potential at the root surface fell to about - 25 bar, the root absorbing power was lower (approximately x 0.2) than that for nutrient solution.--Copyright 1975, Biological Abstracts, Inc. (See also W75-08330)
W76-11925

EQUATION OF INFILTRATION WITH COMPRESSION AND COUNTERFLOW EFFECTS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
H. J. Morel-Seytoux, and J. Khanji.
Hydrological Sciences Bulletin, Vol. 20, No. 4, p 505-517, December 1975. 7 fig, 1 tab, 10 ref. OWRT B-070-COLO(18). 14-31-0001-3566.

Descriptors: *Infiltration, *Infiltration rates, *Mathematical studies, *Air, *Simulation analysis, Equations, Groundwater, Groundwater movement, Soil water movement, Unsaturated flow, Compressibility, Compressible flow, Capillary action, Zone of aeration.
Identifiers: *Cumulative infiltration, Time function, Two-phased flow, Air pressure.

There are several mechanisms by which air affects the infiltration process. In a previous article (See W75-01126) only the viscous resistance to simultaneous flow of water and air was considered. In addition there are other effects: the compression effect, the buoyancy effect, the counterflow effect, the hysteresis effect, and several others. Even though all these effects occur, simultaneously, it is convenient to treat them at first separately and progressively in partial combinations. In this article the compression effect and then the compression and counterflow effects were added to the viscous resistance effect. Formulae for cumulative infiltration versus time were derived. Without the counterflow effect, the functional form of the equation is similar to that of Green and Ampt with two additional correction terms, one for the total viscous resistance effect and one for the compression effect. With counterflow the derived formula no longer has the Green and Ampt functional form. The derived formula remains quite simple. (Morris-ISWS)
W76-11956

ADSORPTION OF PICLORAM (4-AMINO-3,5,6-TRICHLOROFICOLINIC ACID) ON PANOCHE, EPHRATA, AND PALOUSE SOILS: A THERMODYNAMIC APPROACH TO THE ADSORPTION MECHANISM,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 5B.

W76-12142

REDOX POTENTIALS IN SOIL COLUMNS INTERMITTENTLY FLOODED WITH SEWAGE WATER,
Mississipi State Univ., State College. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W76-12145

COLORIMETRIC DETERMINATION OF PARAQUAT RESIDUES IN SOIL AND WATER,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W76-12149

2H. Lakes

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART II. PACIFIC SLOPE BASINS IN CALIFORNIA--VOLUME I. BASINS FROM TIJUANA RIVER TO SANTA MARIA RIVER,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W76-11669

A FICKIAN ANALYSIS OF LAKE SEDIMENT UPSURGE,
Arkansas Univ., Fayetteville. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 2J.
W76-11692

ECOLOGY OF PLANKTONIC INFUSORIA OF SECONDARY-OLIGOTROPHIC LAKE, (IN RUSSIAN),
Gorkii State Univ. (USSR).
For primary bibliographic entry see Field 5C.
W76-11728

THE IMPORTANCE OF ZOOPLANKTON IN THE METABOLISM OF LAKE SCHIEREN, (IN GERMAN),
For primary bibliographic entry see Field 5C.
W76-11735

CHARACTERISTICS AND PRODUCTION POTENTIALS OF ZOOPLANKTON FROM LAKE SHCHELKUN IN THE MIDDLE URALS, (IN RUSSIAN),
Ural and Siberian Fishery Scientific-Research and Planning Inst., Sverdlovsk (USSR).
For primary bibliographic entry see Field 5C.
W76-11737

THE LAKE TEXCOCO (MEXICO) SEDIMENTS AND THEIR CAPACITY TO SUPPORT VEGETATION, (IN FRENCH),
Toulouse-3 Univ. (France).
For primary bibliographic entry see Field 2J.
W76-11738

PHYTOPLANKTON, PRODUCTION AND BREAKDOWN OF ORGANIC MATTER IN THE KUIBYSHEV RESERVOIR, (IN RUSSIAN),
Akademiya Nauk SSSR, Tolyatti. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 5C.
W76-11739

METHODS FOR COMPUTING THE EVAPORATION OF LAKE FERTOE, (IN GERMAN),
Orszagos Meteorologiai Intezet, Budapest (Hungary). Zentralanst. Atmos. Phys.
For primary bibliographic entry see Field 2D.
W76-11741

MEASUREMENT OF LAKE ICE THICKNESS WITH A SHORT-PULSE RADAR SYSTEM,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 7B.
W76-11753

NITROGEN CYCLING IN MICROCOSMS AND APPLICATION TO THE BIOLOGY OF THE NORTHERN ARM OF THE GREAT SALT LAKE,
Utah State University, Logan. Dept of Biology.
For primary bibliographic entry see Field 5C.
W76-11778

THE REPRODUCTIVE BIOLOGY OF THE LEECH HELOBDELLA STAGNALIS (L.) IN UTAH LAKE, UTAH,
Brigham Young Univ., Provo, Utah. Dept. of Zoology.
D. L. Tillman, and J. R. Barnes.
Freshwater Biol. 3(2), p 137-145, 1973.

Descriptors: *Utah, *Reproduction, *Annelids, Biology, Lakes, Temperature.
Identifiers: Gametogenesis, Helobdella-Stagnalis, *Leeches, *Utah Lake(Utah).

The reproductive biology of the glossiphoniid leech H. stagnalis in Utah Lake, Utah(USA), was studied for an 18-mo. period from June 1970-Dec. 1971. In this lake the overwintering adult leeches produce 2 broods of young in May and June. Evidence is presented to support the idea that the same individual can produce 2 broods. Two complete cycles of gametogenesis also take place. Continuous water temperatures were recorded at the study site to correlate with reproductive activity. Gametogenesis appears to be temperature dependent with the 1st generation of sperm taking 4 mo. to be produced in the fall and winter months while the 2nd generation of sperm is produced in 6 wk during the spring. Egg production follows a similar pattern.--Copyright 1973, Biological Abstracts, Inc.
W76-11826

INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES.
International Field Year for the Great Lakes (IFYGL) Bulletin No. 18, May 1976. 101 p, 17 fig, 6 tab. (Great Lakes Environmental Research Laboratory, Ann Arbor, Michigan).

Descriptors: *Great Lakes, *International waters, *International Hydrological Decade, *Canada, *United States, *Lake Ontario, Programs, Publications, Bibliographies, Water temperature, Currents(Water), Lakes.
Identifiers: *International Field Year for the Great Lakes.

Listed were the official International Field Year for the Great Lakes (IFYGL) publications, joint Canadian-U.S. publications included in previous IFYGL Bulletins, and additions to the IFYGL bibliography. Information presented for Lake Ontario included monthly mean temperatures at 15 and 30 meter depths for May through November. Brief reports on both Canadian and U.S. scientific projects were included. Canadian and U.S. summaries of data available from IFYGL archives were tabulated. (Sims-ISWS)
W76-11847

TURBULENT ENTRAINMENT AT THE DENSITY INTERFACE OF A TWO-LAYER STABLY STRATIFIED FLUID SYSTEM,
Johns Hopkins Univ., Baltimore, Md., Dept. of Earth and Planetary Science.
For primary bibliographic entry see Field 2L.
W76-11871

ECOSYSTEM MODELING OF WATER-HYACINTH MANAGEMENT IN LAKE ALICE, FLORIDA,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 5G.
W76-11884

INTERNATIONAL MANAGEMENT OF THE GREAT LAKES-ST. LAWRENCE BASIN,
Western Ontario University, London, Canada, Department of Geography. University of Western Ontario, London. Dept. of Geography.
J. C. Day.
Water Resources Bulletin, Vol. 8, No. 6, p 1120-1136, December 1972. 7 fig, 1 tab, 46 ref.

Descriptors: *International waters, *Great Lakes, *Management, *Fisheries, *River basins, *International Joint Commission, St. Lawrence River, St. Lawrence Seaway, Canada, United States, Water quality, Air quality, Dams, Navigation, Hydroelectric power, Treaties, Diversion.
Identifiers: International cooperation, Boundary water levels.

Neither Canada nor the United States attach much importance to the International Joint Commission (IJC), judging by the size of staffs and annual budgets. The Commission has been restricted to a relatively minor number of functions in the Great Lakes-St Lawrence Basin. It has investigated: the degree and causes of water and air quality deterioration; the effects of hydroelectric and navigation projects on water levels; the impacts of water-level fluctuations; and the feasibility of a deep waterway from the St. Lawrence to the Hudson River. Projects approved by the Commission have produced less than might be expected through no fault of the Commission. The Great Lakes Fishery Commission has promoted little international management. Budgetary limitations restrict its lamprey control program; institutional limitations restrict its ability to deal effectively with fishery problems. Commission responsibilities are limited to coordination and advisory functions. Since Canada and the United States have not chosen to refer most aspects of river basin management to international bodies, an institutional void exists in the Great Lakes Basin to consider these questions on a continuous basis. There is a need for expanded international cooperation. (Bell-Cornell)
W76-11887

THE ROLE OF BENTHIC METABOLISM IN A BOG LAKE,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5C.
W76-11906

BENTHIC METABOLISM OF A SOFT-WATER LAKE,
Connecticut University, Storrs.
For primary bibliographic entry see Field 5C.
W76-11907

RELEASE OF DISSOLVED ORGANIC MATTER BY AUTOLYSIS OF A SUBMERSED MACROPHYTE, SCIRPUS SUBTERMINALIS,
National Inst. for the Environment, Tsukuba (Japan).
For primary bibliographic entry see Field 5C.
W76-11942

THE BATTLE OF LAKE SUPERIOR: RESERVE MINING'S BIG SEWER,
For primary bibliographic entry see Field 5G.
W76-12020

THERMAL STRATIFICATION AND HEATING MECHANISMS IN A SMALL LAKE,
Alberta Univ., Edmonton. Dept. of Botany.

M. Hickman.
Arch Hydrobiol. 74(1), p 60-67, 1974.

Descriptors: *Lakes, *Thermal stratification, Europe, Cycles, Seasonal, Turbulence, Hypolimnion, *Heat transfer, *Water temperature.
Identifiers: *Abbot's Pond(England), U.K.

Seasonal temperature cycles in Abbot's Pond (England) are very similar each yr. The coefficient of eddy turbulence was similar when mean values were considered. However, in 1968 and 1969, the heating patterns did not follow the empirical equations, indicating other factors were involved in the transport of heat through the hypolimnion.--Copyright 1975, Biological Abstracts, Inc.
W76-12139

CARBON-13 ENRICHED CARBONATE IN INTERSTITIAL WATERS OF LAKE KINNERET SEDIMENTS,
Weizmann Inst. of Science, Rehovoth (Israel). Dept. of Isotope Research.
For primary bibliographic entry see Field 5C.
W76-12140

2I. Water In Plants

THE ROLE OF THE AQUATIC EXCHANGE OF CARBON DIOXIDE IN THE ECOLOGY OF THE WATER HYACINTH (EICHHORNIA CRASSIPES),
Florida Univ., Gainesville. Dept. of Zoology.
G. R. Ultsch, and D. S. Anthony.
Fla Sci. 36(1), p 16-22, 1973.

Descriptors: *Carbon dioxide, Ecology, *Water hyacinth, Root systems, Absorption, Plant physiology.
Identifiers: Carbon-14.

Levels of dissolved CO2 under the mats formed by the floating water hyacinth were found to reach levels as high as 60 mm Hg. Field data suggest that CO2 is being removed from the water in the daytime by the extensive root system of the water hyacinths and might be available for photosynthesis. Experiments with 14C-labeled bicarbonate verify that the water hyacinth is capable of fixing dissolved CO2, and this source probably accounts for at least 10% of the total C fixed by this plant.--Copyright 1975, Biological Abstracts, Inc.
W76-11921

WATER STRESS SUSPENDS LEAF AGEING,
Commonwealth Scientific and Industrial Research Organization, St. Lucia (Australia). Div. of Tropical Agronomy.
M. M. Ludlow, and T. T. Ng.
Plant Sci. Lett. 3(4), p 235-240, 1974.

Descriptors: *Photosynthesis, Leaves, Inhibition, *Aging(Biological), Hydration.
Identifiers: Panicum-maximum-var-trichoglume, Senescence, *Green panic, *Water stress, *Leaf water potentials.

Leaf water potentials less than -- 12 bars inhibited net photosynthesis of green panic (Panicum maximum var. trichoglume), and suspended the normal decline of photosynthesis associated with leaf aging, until the stress was relieved and active net photosynthesis recommended. This suspension of photosynthetic decline occurred at stress levels down to approximately -- 90 bars provided leaves did not die as a direct result of water stress (as opposed to death associated with normal senescence). The photosynthetic mechanism was not permanently affected by these levels of stress and, after rewatering, surviving leaves attained rates greater than control leaves of the same chronological age but comparable with those of the same physiological age.--Copyright 1975, Biological Abstracts, Inc.
W76-11934

STRUCTURE AND FUNCTION OF STREAM ECOSYSTEMS,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
K. W. Cummins.
Bioscience. 24(11), p 631-642, 1974.

Descriptors: *Ecosystems, *Streams, Classification, *Organic matter, *Carbon dioxide, *Plant growth, Systematics, Biology.

General functional, interrelated components were defined and initially dimensioned for representative stream ecosystems. Additional or alternative functional criteria are sought to replace classical taxonomic units. Attention is now focussed on efficient conversion of organic matter to CO2 and the mantainance of a minor role for instream plant growth.--Copyright 1975, Biological Abstracts, Inc.
W76-12137

2J. Erosion and Sedimentation

A FICKIAN ANALYSIS OF LAKE SEDIMENT UPSURGE,
Arkansas Univ., Fayetteville. Dept. of Chemical Engineering.
L. Thibodeaux, and C. K. Cheng.
Water Resources Bulletin, Vol. 12, No. 2, p 221-236, April 1976. 6 fig, 4 tab, 10 ref. OWRT A-026-ARK(2).

Descriptors: *Lake sediments, *Thermal stratification, *Epilimnion, *Nutrients, *Model studies, Sediment-water interfaces, Eutrophication, Sediment distribution, Analytical techniques, Turbulence, Seasonal.
Identifiers: *Sediment upsurge, *Fickian type models, Equinoxes.

During the period between the vernal and autumnal equinox, the net heat transfer into the lake is positive, and lake stratification occurs with a stable water column consisting of warm water above and cold water below. Some lakes experience reverse stratification in winter but in March the lake is usually at uniform conditions with respect to temperature and chemical species concentration. The stratified-mixed states which occur annually in lakes play a dominant role in the movement of nutrient-rich material from the lake bottom upward into the water column. The semi-infinite slab energy model to represent the lake surface temperature, thermal profile, and thermocline position was extended to include a Fickian type model for the upsurge of nutrients from the sediment-water interface upward. Relations were developed for the rate of nutrient upwelling into the epilimnion and the photoactive zone of a lake. A lake time constant was developed from the model equations. This constant is considered important for predicting the likelihood of a fall algal bloom. Results on model verification attempts on three lakes were presented. (Singh-ISWS)
W76-11692

THE USE OF MULTIPLE REGRESSION MODELS IN PREDICTING SEDIMENT YIELD,
Arizona Univ., Tuscon. Dept. of Management.
J. E. Weber, M. M. Fogel, and L. Duckstein.
Water Resources Bulletin, Vol. 12, No. 1, p 1-17, February 1976. 9 fig, 4 tab, 9 ref. OWRT B-043-ARIZ(2)and B-032-ARIZ(24).

Descriptors: *Sediment yield, *Regression analysis, *Model studies, *Watershed management, *Analytical techniques, Design, Erosion, Particle size, Soil types, Statistics.
Identifiers: *Model choice, Multiple linear regression, Data transformation.

Four commonly used models for predicting sediment yield were analyzed and compared using previously published data. Three of these models involved logarithmic transformations. Some of the problems involved in transforming data were discussed in the context of logarithmic transformations. The test data pertained to 39 watersheds in 11 western states, varying in size from a few acres to more than 50 square miles. Slope erosion is the only major sediment source in these watersheds. Standard regressions using the four models and test data illustrated the problems that may be caused by transformations. The standard regression analysis and the economic loss function analysis indicated that a linear model is preferable for predicting sediment yields. If any transformation is made to satisfy the normality assumptions of linear regression analysis, it should be determined from the distribution of the sample residuals. (Singh-ISWS)
W76-11693

THE LAKE TEXCOCO (MEXICO) SEDIMENTS AND THEIR CAPACITY TO SUPPORT VEGETATION, (IN FRENCH),
Toulouse-3 Univ. (France).
J. C. Revel, V. Ojeda, and J. Rivera.
Bull Assoc Fr Etude Sol. 3, p 193-200, 1974.

Descriptors: *Lakes, *Mexico, *Lake sediments, *Vegetation, *Salts, Gels, Leaching, Salinity, Dehydration, Permeability, Alkalinity, Drying.
Identifiers: *Lake Texcoco(Mexico).

The drying of Lake Texcoco left bare stretches of impermeable, saline and alkaline sediments, unsuitable for any kind of vegetation. The properties of the salt sediments ('jaboncillo') are due to a gel, liable to irreversible dehydration, making the sediments permeable and prone to leaching.--Copyright 1975, Biological Abstracts, Inc.
W76-11738

CONSTRUCTION AND STABILIZATION OF COASTAL FOREDUNES WITH VEGETATION: PADRE ISLAND, TEXAS,
Texas Tech Univ., Lubbock. Dept. of Range and Wildlife Management.
For primary bibliographic entry see Field 2L.
W76-11752

THE COLVILLE RIVER AND THE BEAUFORT SEA: SOME INTERACTIONS,
Louisiana State Univ., Baton Rouge. Dept. of Geography and Anthropology.
For primary bibliographic entry see Field 2L.
W76-11767

RIVERBANK FORMS OF THE COLVILLE RIVER DELTA,
Aberdeen Univ., (Scotland), Dept. of Geography.
For primary bibliographic entry see Field 2L.
W76-11769

BULK DENSITY-WATER CONTENT RELATIONSHIP IN MARINE SILTS AND CLAYS,
Lehigh Univ., Bethlehem, Pa.
For primary bibliographic entry see Field 2L.
W76-11771

TEMPORAL CHANGES IN THE OFFSHORE ISLANDS OF MISSISSIPPI,
Mississippi Univ., University. Dept. of Geology and Geological Engineering.
T. H. Waller, and L. P. Malbrough.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-257 150, $5.50 in paper copy, $3.00 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report, July 1976. 109 p, 32 fig, 49 ref, 3 append. OWRT A-098-MISS(1).

Descriptors: Beaches, Erosion, *Deposition(Sediments), *Mississippi, Gulf of Mexico, *Barrier islands, *Temporal distribution,

*Beach erosion, *Shores, Sediments, Cycles, Tropical cyclones.
Identifiers: Sea level changes.

Historical monitoring of Mississippi's barrier islands (Petit Bois, Horn, Ship, Cat) records the nature and magnitude of changes in position of the shoreline and provides insight into the factors affecting those changes. Documentation of long-term changes from available records involved repetitive sequential mapping of shoreline positions using vintage coastal topographic charts and aerial photographs. Long-term trend or direction of shoreline changes averaged over the 124-year time period (1848 to 1973) indicate that maximum net rates of accretion (16 to 125 feet per year) were recorded on the western ends of Petit Bois, Horn, and Ship islands and North Point of Cat Island. Maximum net erosion (44 to 322 feet per year) dominated the eastern ends of Petit Bois, Horn, and Ship islands and South Spit of Cat Island. Net loss of land during the 124-year time period amounted to 1800 acres or over 18 percent of the land area in 1848. The major factors affecting shoreline changes are deficit in sediment supply, high frequency impact of tropical cyclones, and sea-level changes. Comparison of shorelines indicates definite short-term cycles of erosion related to storms (primarily hurricanes) and partial recovery during intervening years of low storm incidence.
W76-11905

THE ROLE OF BENTHIC METABOLISM IN A BOG LAKE,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5C.
W76-11906

BENTHIC METABOLISM OF A SOFT-WATER LAKE,
Connecticut University, Storrs.
For primary bibliographic entry see Field 5C.
W76-11907

OFFSHORE SEDIMENT TRANSPORT AND EQUILIBRIUM BEACH PROFILES,
Waterloopkundig Laboratorium, Delft (Netherlands).
For primary bibliographic entry see Field 2L.
W76-11937

2K. Chemical Processes

SPRING FLOW FROM PRE-PENNSYLVANIA ROCKS IN THE SOUTHWESTERN PART OF THE NAVAJO INDIAN RESERVATION, ARIZONA,
Geological Survey, Cheyenne, Wyo.
For primary bibliographic entry see Field 2F.
W76-11673

A PRELIMINARY EVALUATION OF THE CHEMICAL CHARACTER OF WATER NEAR THE NORTHWEST SHORE OF TOPAZ LAKE, DOUGLAS COUNTY, NEVADA,
Geological Survey, Carson City, Nev.
For primary bibliographic entry see Field 5A.
W76-11674

APPRAISAL OF THE WATER RESOURCES OF CHARLOTTE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4C.
W76-11676

HYDROLOGIC RECONNAISSANCE OF THE PINE VALLEY DRAINAGE BASIN, MILLARD, BEAVER, AND IRON COUNTIES, UTAH,
Geologicsl Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 4B.
W76-11683

THE AGE OF GROUNDWATER IN THE CHALK OF THE LONDON BASIN,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 2F.
W76-11848

REGIONAL CHARACTERISTICS OF THE TOTAL DISSOLVED MINERALS IN STREAM WATERS IN ILLINOIS,
Northern Illinois Univ., DeKalb. Dept. of Geology.
For primary bibliographic entry see Field 5A.
W76-11857

AN EVALUATION OF THE MILLER METHOD FOR DISSOLVED OXYGEN ANALYSIS,
Wollongong Univ. Coll. (Australia). Div. of Biology and Chemical Sciences.
For primary bibliographic entry see Field 5A.
W76-12144

COLORIMETRIC DETERMINATION OF PARAQUAT RESIDUES IN SOIL AND WATER,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W76-12149

2L. Estuaries

TRANSIENT SIMULATION OF SALTWATER INTRUSION IN SOUTHEASTERN FLORIDA,
Princeton Univ., N. J. Dept. of Civil Engineering; an Princeton Univ., N. J. Water Resources Program.
G. Segol, and G. F. Pinder.
Water Resources Research, Vol 12, No. 1, p 65-70, February 1976. 8 fig, 12 ref. OWRT C-5224(4214)(3).

Descriptors: *Saline water intrusion, *Aquifers, *Florida, *Model studies, *Mathematical models, Groundwater, Sea water, Subsurface waters, Interfaces, Saline water-freshwater interfaces, Rainfall, Pumping, Coasts, Water table, Water levels, Water quality.
Identifiers: *Biscayne aquifer(Fla).

The Galerkin-finite element method can be used to simulate the two-dimensional movement of the saltwater front in the Cutler area of the Biscayne aquifer near Miami, Florida. The concentration distributions for steady state and transient conditions can be obtained by using pressure head data mesured in the field for formulating boundary conditions. The numerical results were found to be in satisfactory agreement with the experimental data. Discrepancies observed in the central part of the aquifer between field and computed values were thought to indicate the presence of a higher-permeability region. (Sims-ISWS)
W76-11689

DDT PLUS PCB'S IN BLUBBER OF HARBOR SEALS,
National Marine Fisheries Service, Seattle, Wash. Northwest Fisheries Center.
For primary bibliographic entry see Field 5A.
W76-11698

POLLUTION OF THE MEDITERRANEAN AROUND NAPLES,
Durham Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 5B.
W76-11713

WILDFOWL AND POLLUTION IN THE TAY ESTUARY,
Dundee Coll. of Technology (Scotland). Dept. of Physics.
For primary bibliographic entry see Field 5C.
W76-11714

EXPORT OF LEAD FROM SALT MARSHES,
Marine Biological Lab., Woods Hole, Mass. Boston Univ. Marine Program.
For primary bibliographic entry see Field 5B.
W76-11717

MERCURY CONTENT OF MUSSELS FROM WEST EUROPEAN COASTS,
Central Lab. TNO, Delft (Netherlands).
For primary bibliographic entry see Field 5B.
W76-11718

DIETARY HABITS AND HEAVY METAL CONCENTATIONS IN FISH FROM THE SEVERN ESTUARY AND BRISTOL CHANNEL,
Bath Univ. (England).
For primary bibliographic entry see Field 5C.
W76-11721

SEASONAL VARIATION OF DISSOLVED METALS IN INSHORE WATERS OF THE MENAI STRAITS,
University Coll. of North Wales, Bangor. Marine Science Labs.
For primary bibliographic entry see Field 5B.
W76-11722

MERCURY ENRICHMENT IN ESTUARINE PLANT DETRITUS,
Florida State Univ., Tallahassee. Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W76-11724

SEABIRD MORTALITY IN THE NORTH IRISH SEA AND FIRTH OF CLYDE EARLY IN 1974,
Royal Society for the Protection of Birds, Sandy (England).
For primary bibliographic entry see Field 5C.
W76-11727

ON THE PROROCENTRUM RED TIDE OCCURRED IN THE COASTAL WATERS OF TOYOURA, FUNKA BAY, HOKKAIDO, IN SEPTEMBER, 1973, (IN JAPANESE),
For primary bibliographic entry see Field 5C.
W76-11740

A THREE-DIMENSIONAL NUMERICAL MODEL OF THE ESTUARY CIRCULATION AND SALINITY IN NARRAGANSETT BAY,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
K. W. Hess.
Estuarine and Coastal Marine Science, Vol. 4, No. 3, p 325-338, May 1976. 5 fig, 17 ref.

Descriptors: *Model studies, *Estuaries, *Flow, *Mathematical models, Rivers, Discharge(Water), *Salinity, Water quality, Circulation, Water circulation, Coasts, Tidal waters, Bays, Depth, Analytical techniques, Equations, Hydrodynamics, *Rhode Island, *Path of pollutants.
Identifiers: *Narragansett Bay(RI), Three-dimensional models.

Gravitational circulation in an estuary was produced primarily by longitudinal density differences, but other factors, such as local topography, the Coriolis acceleration, and lateral density variations may be equally important. A generalized three-dimensional rigid-lid model of the steady, density-driven flow was formulated,

which includes spatial variations in depth, eddy viscosity and diffusivity, and horizontal pressure gradients. An equation of steady salt conservation was also solved, including convection, based on the gravitation circulation and diffusion in the three directions. Some details of the numerical computations were presented and comparisons with observations from Narragansett Bay were evaluated. Cyclonic circulation predicted by the model was discussed as an example of its capabilities. (Sims-ISWS)
W76-11746

LOS ANGELES AND LONG BEACH HARBORS MODEL STUDY; REPORT 1, PROTOTYPE DATA ACQUISITION AND OBSERVATIONS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W76-11751

CONSTRUCTION AND STABILIZATION OF COASTAL FOREDUNES WITH VEGETATION: PADRE ISLAND, TEXAS,
Texas Tech Univ., Lubbock. Dept. of Range and Wildlife Management.
B. E. Dahl, B. A. Fall, A. Lohse, and S. G. Appan.
Available from the National Technical Information Service, Springfield, Va. 22161, as ADA-018-065 $7.50 inpaper copy, $3.00 in microfiche. Coastal Engineering Research Center Miscellaneous Paper No. 9-75 September 1975. 188 p, 57 fig, 60 tab, 89 ref, 2 append.

Descriptors: *Coastal engineering, *Shore protection, *Vegetation establishment, *Erosion control, *Texas, Vegetation effects, Coasts, Beaches, Beach erosion, Soil erosion, Tidal effects, Waves(Water), Dunes, Sands, Wind erosion, Plant populations, Soil conservation, Soil stabilization, Cover crops, Grasses, Planting management.
Identifiers: *Padre Island(Tex), Beach grasses, Sea oats, Bitter panicum.

Experiments were conducted from 1969 to 1974 on Padre Island, Texas, to establish technical specifications and methodologies for use of beach grasses to construct and stabilize foredunes as storm surge barriers along the gulf coast. Bitter panicum and sea oats were the best adapted species for beach plantings. The most successful method of establishing vegetated dune ridge was transplanting these grasses on the backshore, where they trapped, grew through, and stabilized accumulating sand. Foredunes were established across overwash channels by creating an elevated, flat, relatively salt-free surface using parallel rows of 2-foot-high sand fencing, and then transplanting both grasses. (See also W75-10887) (Sims - ISWS)
W76-11752

APPLICATION OF REMOTELY SENSED MULTISPECTRAL DATA TO AUTOMATED ANALYSIS OF MARSHLAND VEGETATION,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
W. G. Cibula.
NASA Technical Note D-8139, February 1976. 31 p, 17 fig, 3 tab, 13 ref.

Descriptors: *Remote sensing, *Marshes, *Wetlands, *Louisiana, Aerial photography, Coastal marshes, Salt marshes, Vegetation, Classification, Estuaries, Mosquitoes, Insects, Computer programs, Data processing, Analytical techniques, Instrumentation.

A freshwater-to-brackish marsh near Slidell, Louisiana, was studied to demonstrate the use of remotely sensed data from an airborne multispectral scanner and computer processing technique for identifying and classifying vegetational cover to determine areas that are potential breeding sites for the salt marsh mosquito, Aedes sollicitans. Supporting ground investigations were performed to locate areas of uniform plant species plant communities for use as calibration sites, or 'training fields,' in the computer analysis. The spectral signatures of these training fields provided the basis for computer decisions on the classification of vegetational complexes in the total study area. Later ground studies indicated a high degree of accuracy in the overall classification. The computer programs used for processing the data were developed at the Purdue University Laboratory for Application of Remote Sensing and modified for this study. In the CLASSIFY program, the digital table look-up method was found to be the fastest and the most economical. (Sims - ISWS)
W76-11754

DEVELOPMENT OF AN AIRBORNE LASER BATHYMETER,
National Aeronautics and Space Administration, Wallops Island, Va. Wallops Flight Center.
For primary bibliographic entry see Field 7B.
W76-11755

THE COLVILLE RIVER AND THE BEAUFORT SEA: SOME INTERACTIONS,
Louisiana State Univ., Baton Rouge. Dept. of Geography and Anthropology.
H. J. Walker.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-A009 549, $4.00 in paper copy, $3.00 in microfiche. Technical Report No. 186, June 1975. 28 p, 23 fig, 20 ref. Reprinted from The Coast and Shelf of the Beaufort Sea, The Arctic Institute of North America, Arlington, Virginia, p 513-540, 1974. ONR N00014-69-A-0211-0003.

Descriptors: *Arctic, *Rivers, *Deltas, *Alaska, Permafrost, Cold regions, Estuaries, Oceans, Floods, Floodwater, Saline water-freshwater interfaces, Flow, Streamflow, Salinity, Ice, Tundra, Sediments, Suspended solids, Sedimentation, Drainage, Hydrology.
Identifiers: *Colville River(Alaska), *Beaufort Sea(Alaska).

Rivers which originate within the zone of continuous permafrost virtually cease flow during winter so that for a period of several months no fresh water or sediment is transported to the ocean. The Colville River in northern Alaska, which is of this type, was studied to determine the nature of the interactions between river and ocean during breakup. By the end of winter the subaqueous portion of the delta consists of a band of snow-covered bottomfast ice which extends seaward to about 2-m depth, a 2- to 3-m ice cover seaward of the bottomfast ice, hypersaline water in unfrozen pockets in the zone of bottomfast ice, and sea water of normal salinity seaward thereof. Spring floodwaters first flush the winter sea water from the delta channels and then flow seaward both over and under the sea ice. Water moving over the sea ice eventually drains through cracks in the ice, but only after much sediment has been deposited. The floodwater beneath the ice advances seaward as a wedge and maintains a sharp interface with the sea water beneath. Although little mixing occurs across the interface during flooding, some suspended material nonetheless settles through to the bottom. Intense flooding normally lasts less than 2 weeks after which the relatively warm fresh water gradually mixes with the cold marine water to create the brackish water system that prevails throughout the summer. (Sims-ISWS)
W76-11767

RIVERBANK FORMS OF THE COLVILLE RIVER DELTA,
Aberdeen Univ., (Scotland), Dept. of Geography.
W. Ritchie, and H. J. Walker.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-A009 550, $3.50 in paper copy, $3.00 in microfiche. Technical Report No. 187, June 1975. 18 p, 12 fig, 2 tab, 2 ref. Reprinted from The Coast and Shelf of the Beaufort Sea, The Arctic Institute of North America, Arlington, Virginia, p 545-562, 1974. ONR N00014-69-A-0211-0003.

Descriptors: *Arctic, *Rivers, *Deltas, *Alaska, Permafrost, Cold regions, Banks, Erosion, Bank erosion, Sediments, Suspended solids, Sedimentation, Ice, Tundra, Geomorphology, Hydrology.
Identifiers: *Colville River(Alaska).

The Colville River delta, about 600 sq km in area, has a number of distributaries which empty into the Beaufort Sea across a 45-km front. Distributary banks are composed of a variety of matrials, including peats, gravels, sands, and finer sediments. In addition, because the delta is in the zone of continuous permafrost, banks are frozen and contain several ice forms, including ice wedges. Of the nine types of banks identified, four are erosional, four depositional, and one neutral. The ratio of erosional to depositional banks is about 12:7, with right-hand banks being 72% erosional and left-hand banks 46% erosional. Depositional forms include large-scale river bars and point bars. Low river stages during summer render these bars analogous to beaches, and a sequence of dunes have formed along most riverbanks with a northeast exposure. Thermal erosion and thermal melting are responsible for the development of niches near the base of the banks and for digitate troughs leading back from the river along ice wedges. Bank collapse and block slumping are common, and large amounts of deltaic sediment are contributed to the river and transported seaward. The specific morphologic characteristics of erosional banks vary with bank materials, river stage, current velocity and aspect. (Sims - ISWS)
W76-11769

BULK DENSITY-WATER CONTENT RELATIONSHIP IN MARINE SILTS AND CLAYS,
Lehigh Univ., Bethlehem, Pa.
A. F. Richards, T. J. Hirst, and J. M. Parks.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-A012 047, $3.50 in paper copy, $3.00 in microfiche. Journal of Sedimentary Petrology, Vol. 44, No. 4, p 1004-1009, December 1974. 4 fig, 33 ref. ONR N00014-67-A-0370-0005, NOAA 1-35357 and NG-2-72.

Descriptors: *Sediments, *Oceans, *Silts, *Clays, Bulk density, Moisture content, Bottom sediments, Measurement, Laboratory tests, Regression analysis, Equations, On-site investigations, Cores, Sedimentation.
Identifiers: *Marine sediments.

Bulk density and water content were defined and then related to one another and to void ratio by 7 polynomial regression equations based on 1680 measured bulk density and water content values of water-saturated sediments from the Atlantic and Pacific Oceans and other areas. Theoretical relationships between bulk density, water content, and void ratio for specific gravities between 2.30 and 2.85 were demonstrated. The average specific gravity of 2.72 found for the data presented compared favorably to similar values reported in the literature. Use can be made of the regression equations to compute e log p bar sedimentation-compression curves entirely determined from the bulk density of water-saturated sediment measured nondestructively by laboratory or in situ nuclear transmission densitometers. In an example showing the consolidation of a fine-grained calcareous sediment from the Exuma Sound, Bahamas, the all-nuclear laboratory method compared favorably with the conventional, non-nuclear method of constructing e log p bar curves. The combination of suitable regression equations and the all-nuclear method is equally applicable to other fine-grained water-saturated sediments. (Sims - ISWS)
W76-11771

EVALUATION OF SLUDGE DUMPING OFF DELAWARE BAY,
Delaware Univ., Lewes. Coll. of Marine Studies.
For primary bibliographic entry see Field 5B.
W76-11792

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA. PART III. THERMAL TOLERANCE AND SEDIMENT TOXICITY STUDIES,
University of Southern California, Los Angeles. Allan Hancock Foundation.
For primary bibliographic entry see Field 5C.
W76-11793

THERMAL EFFECTS AND SAN PEDRO BAY,
University of Southern California, Los Angeles. Allan Hancock Foundation.
For primary bibliographic entry see Field 5C.
W76-11794

EFFECTS OF SUB-NORMAL TEMPERATURES ON SOME COMMON LOS ANGELES HARBOR ANIMALS,
University of Southern California, Los Angeles. Allan Hancock Foundation.
For primary bibliographic entry see Field 5C.
W76-11796

PRELIMINARY INVESTIGATIONS OF THE EFFECTS OF RESUSPENDED SEDIMENT ON TWO SPECIES OF BENTHIC POLYCHAETES FROM LOS ANGELES, HARBOR,
University of Southern California, Los Angeles. Allan Hancock Foundation.
For primary bibliographic entry see Field 5C.
W76-11799

FIN EROSION IN WINTER FLOUNDER,
National Marine Fisheries Service, Highlands, N. J. Sandy Hook Sport Fisheries Marine Lab.
For primary bibliographic entry see Field 5C.
W76-11809

INCIDENCE OF POLYCHLORINATED BIPHENYLS IN CLYDE SEAWEED,
Leeds Univ. (England). Wellcome Marine Lab.
For primary bibliographic entry see Field 5C.
W76-11810

EUTROPHICATION OF A PARTIALLY ENCLOSED ESTUARINE MUDFLAT,
National Inst. for Physical Planning and Construction Research, Dublin (Ireland).
For primary bibliographic entry see Field 5C.
W76-11811

EFFECTS OF PETROLEUM ON ESTUARINE BACTERIA,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W76-11814

INTERTIDAL ORGANISMS OF AN INDUSTRIALIZED ESTUARY,
Paisley Coll. of Technology (Scotland). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W76-11815

POLLUTION OF HONG KONG'S COMMERCIAL OYSTER BEDS,
Hong Kong Univ. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W76-11817

INTERTIDAL FAUNA OF THE INDUSTRIALIZED FORTH ESTUARY,
Stirling Univ. (Scotland). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W76-11818

POLYSTYRENE SPHERULES IN THE SEVERN ESTUARY-A PROGRESS REPORT,
Bath Univ. (England). School of Biological Sciences.
For primary bibliographic entry see Field 5B.
W76-11819

ELIMINATION OF HYDROCARBONS BY MUSSELS,
Instituto di Biologia del Mare, Venice (Italy).
For primary bibliographic entry see Field 5C.
W76-11822

DEVICE FOR DAMPING WAVES,
Mitsui Shipbuilding and Engineering Co. Ltd., Tokyo (Japan). (Assignee).
For primary bibliographic entry see Field 8B.
W76-11825

GRAVITY WAVES PROPAGATED OVER PERMEABLE BOTTOM,
Polish Academy of Sciences, Gdansk. Inst. of Hydraulic Research.
For primary bibliographic entry see Field 8B.
W76-11853

PARAMETERS AFFECTING STABILITY OF RUBBLE MOUNDS,
Norges Tekniske Hoegskole, Trondheim. Institutt for Anleggsdrift og Havnebygging.
For primary bibliographic entry see Field 8B.
W76-11854

TURBULENT ENTRAINMENT AT THE DENSITY INTERFACE OF A TWO-LAYER STABLY STRATIFIED FLUID SYSTEM,
Johns Hopkins Univ., Baltimore, Md., Dept. of Earth and Planetary Science.
L. H. Kantha.
Available from the National Technical Information Service, Springfield, Va 22161 as ADA-016 607, $6.75 in paper copy, $3.00 in microfiche. Technical Report 75-1, August 1975. 162 p, 77 fig, 3 tab, 35 ref, 5 append. ONR N00014-75-C-0700, NSF DES72-01549-A02.

Descriptors: *Turbulent boundary layers, *Entrainment, *Mixing, Density, Turbulence, Shear, Laboratory tests, Salinity, Interfaces, Saline water-freshwater interfaces, Equipment, Model studies, Hydraulic models, Lakes, Oceans.
Identifiers: *Turbulent entrainment.

This report deals with the turbulent entrainment at the density interface of a stable two-layer stratified fluid, resulting from the application and maintenance of a constant shear stress at the top of the upper layer. The investigation is the continuation of the experiments reported earlier by Kato and Phillips (see W70-0183). It was found that the entrainment rate (defined as the ratio of the entrainment velocity to the friction velocity) is a general function of the interface Richardson number (Ri) and is not restricted to a power law with a unique index over the Richardson number range investigated (30-1100). The function can, however, be approximately fitted by a power law Ri to the (-n) power over limited ranges of Ri, but then the index n depends on the Ri range and is a monotonic function of Ri. The results seem to resolve the existing controversy on whether the entrainment should follow the Ri to the (-1) or (-3/2) power law. Furthermore, the entrainment rates observed were considerably higher than those obtained by Kato and Phillips. (Sims-ISWS)
W76-11871

OFFSHORE BARS ALONG THE ALASKAN ARCTIC COAST,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
A. D. Short.
Available from the National Technical Information Service, Springfield, Va 22161 as ADA-009 035, $3.50 in paper copy, $3.00 in microfiche. Technical Report No. 183, June 1975. 13 p, 14 fig, 2 tab, 13 ref. Reprinted from Journal of Geology, Vol. 83, p 209-221, 1975. ONR N00014-69-A-0211-0005.

Descriptors: *Sand bars, *Coasts, *Arctic Ocean, *Alaska, Waves(Water), Ocean waves, Geomorphology, Beaches, Shores, Aerial photography, On-site investigations, Bathymetry, Tundra, Sands, Cold regions.
Identifiers: *Offshore bars, Bar migration.

Well-developed offshore bars along the 1,355-km-long Alaskan Arctic coast possess three distinctive forms: (1) multiple parallel bars containing inner and outer bar systems; (2) long, parallel bars occurring in series but attached to the shore at their updrift ends; and (3) shorter en echelon bars attached to the shore. Some short en echelon bars are migrating to the west at a rate of 70 m/yr and moving sediment on the order of 400,000 cu m/yr. Bars attached to the beaches generate pronounced shoreline rhythms consisting of horns and bays with amplitudes up to 200 m and lengths of 4-5 km. Low beach-ridge and swale systems are preserved on the horns and destroyed in the bays. The bays, where the beach is narrowest, tend to coincide with locations of inlets or erosion of the tundra hinterland. Field evidence strongly indicated that variation in bar forms is related to the angle of dominant wave approach to the shore; bars tend to be shorter and more transverse to the shore where waves arrive at large angles, and longer and more parallel to the shore where waves arrive more parallel to the shore. (Sims-ISWS)
W76-11873

A MODEL OF PATCHINESS FOR PREY-PREDATOR PLANKTON POPULATIONS,
Liege Univ. (Belgium) Institut of Mathematique.
For primary bibliographic entry see Field 5C.
W76-11878

A BOUNDARY VALUE APPROACH FOR ESTUARINE WATER QUALITY MODELLING WITH RESULTS FOR JAMAICA BAY, NEW YORK,
Texas Univ. at Austin. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 5B.
W76-11881

PLASTIC PARTICLES IN SURFACE WATERS OF THE NORTHWESTERN ATLANTIC,
National Marine Fisheries Service, Narragansett, R.I. Narragansett Lab.
For primary bibliographic entry see Field 5B.
W76-11889

TEMPORAL CHANGES IN THE OFFSHORE ISLANDS OF MISSISSIPPI,
Mississippi Univ., University. Dept. of Geology and Geological Engineering.
For primary bibliographic entry see Field 2J.
W76-11905

METHOD OF CONTROL OF LAND AND WATER USES IN THE COASTAL ZONE,
George Washington Univ., Washington, D. C.
For primary bibliographic entry see Field 6E.
W76-11922

PETROLEUM DEGRADATION IN LOW TEMPERATURE MARINE AND ESTUARINE ENVIRONMENTS,
Rhode Island Univ., Kingston. Dept. of Plant Pathology-Entomology.
For primary bibliographic entry see Field 5B.
W76-11924

COASTAL ZONE POLLUTION BY OIL AND OTHER CONTAMINANTS: GUIDELINES FOR POLICY, ASSESSMENT AND MONITORING IN TROPICAL REGIONS. BASED UPON A CASE STUDY IN INDONESIA, IN 1973,
Smithsonian Institution, Washington, D. C.
For primary bibliographic entry see Field 5B.
W76-11935

OFFSHORE SEDIMENT TRANSPORT AND EQUILIBRIUM BEACH PROFILES,
Waterloopkundig Laboratorium, Delft (Netherlands).
D. H. Swart.
Available from the National Technical Information Service, Springfiel Va 22161, as N75-26615, $9.75 in paper copy, $3.00 in microfiche. Delft Hydraulics Laboratory Doctor's thesis, Publication No. 131, 1974; Delft Hydraulics Laboratory Report M918, Part 2, 1974. 318 p, 89 fig, 18 tab, 54 ref.

Descriptors: *Sediment transport, *Beaches, *Engineering structures, *Prototypes, *Models studies, Groines(structures).
Identifiers: *Equilibrium beach profiles, *Wave action.

A predictive model, based on both model and prototype data, is developed to enable the computation of the offshore sediment transport on sandy beaches under wave action, as well as of the corresponding time-dependent and eventual equilibrium beach profiles. The offshore transport taking place in the D-profile (the real developing profile) is the subject of this report. The time-dependent erosion of the backshore and growth of the transition area only serve as boundary conditions for the process in the D-profile. An analysis is made of the internal mechanism, in order to lead to a schematization, which is as close as possible to the actual physical process. The schematization is worked out more thoroughly and derived in its final form. The area of applicability of the theory is derived and correlated to the available model and prototype data. The bed material in all tests used for evaluation was sand, the median particle diameters ranged between 011 mm and 0.227 mm. As the number of tests in which onshore transport occurred is negligible, only tests in which offshore transport occurred were used in this study. The data were processed according to the developed schematization and the results are presented and evaluated. The steps that are to be followed in the application of the method are summarized. (Sinha - OEIS)
W76-11937

RESULTS OF OCEAN DIFFUSION AND BIOLOGICAL STUDIES OF THE HOLLYWOOD, FLORIDA, OCEAN OUTFALL,
Environmental Science and Engineering, Inc., Gainesville, Fla.
For primary bibliographic entry see Field 5B.
W76-11938

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOLUME 1.
Council on Environmental Quality, Washington, D. C.
For primary bibliographic entry see Field 6G.
W76-11947

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 5, POTENTIAL BIOLOGICAL EFFECTS OF HYPOTHETICAL OIL DISCHARGES IN THE ATLANTIC COAST AND GULF OF ALASKA.
Massachusetts Inst. of Tech., Cambridge, Mass.
For primary bibliographic entry see Field 6G.
W76-11952

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 5. OIL SPILL TRAJECTORY STUDIES FOR ATLANTIC COAST AND GULF OF ALASKA.
Massachusetts Inst. of Tech., Cambridge, Mass.
For primary bibliographic entry see Field 6G.
W76-11955

HEAVY METALS IN ORGANISMS OF THE ATLANTIC COAST OF S.W. SPAIN AND PORTUGAL,
Bristol Univ. (England). School of Chemistry.
For primary bibliographic entry see Field 5B.
W76-11961

ARSENIC IN MARINE ORGANISMS FROM WEST GREENLAND,
B. C. Research Ltd., Vancouver.
For primary bibliographic entry see Field 5C.
W76-11962

CADMIUM LEVELS AND CARBOHYDRATE METABOLISM IN LIMPETS,
Bristol Polytechnic (England). Dept. of Science.
For primary bibliographic entry see Field 5C.
W76-11963

TRACE METAL CONTENT IN THE AMERICAN OYSTER,
National Marine Fisheries Service, Milford, Conn. Milford Lab.
For primary bibliographic entry see Field 5C.
W76-11964

DISTRIBUTION OF SOME TRACE METALS IN POOLE HARBOUR, DORSET,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
For primary bibliographic entry see Field 5B.
W76-11965

TRACE METALS IN OYSTERS FROM KNYSNA ESTUARY,
National Physical Research Lab., Pretoria (South Africa).
H. R. Watling, and R. J. Watling.
Marine Pollution Bulletin, Vol. 7(3): 1976, p. 45-48, 4 tab., 2 fig., 12 ref.

Descriptors: Water pollution effects, *Metals, *Oysters, *Zinc, *Cadmium, *Copper, *Iron, Manganese, *Nickel, Silver, Pathology(Animal), Aquatic animals, Trace elements, Benthos, Estuarine environment, Africa.
Identifiers: *Trace-metal pollution, *Crassostrea, *Ostrea, Tissue content, Metal content, *Knysna estuary(South Africa).

A preliminary survey of seven trace metals in three species of oyster from the Knysna estuary, South Africa, has been carried out. The results indicate that this area is as yet unpolluted; the data provide baseline levels against which future trace-metal pollution can be measured. Two species of oyster are being grown at a number of sites as part of a long-term program to monitor trace-metal levels in the estuary. (Katz)
W76-11966

REDUCED GROWTH AND SURVIVAL OF CLAMS TRANSPLANTED TO AN OIL SPILL SITE,
Maine State Dept. of Marine Resources, Augusta.
For primary bibliographic entry see Field 5C.
W76-11968

HINDGUT MICROFLORA FROM OIL-POLLUTED SOFT-SHELL CLAMS,
Rhode Island Univ., Kingston. Dept. of Plant Pathology-Entomology.
For primary bibliographic entry see Field 5C.
W76-11969

THE ILLUSORY TREASURE OF DAVY JONES' LOCKER,
Southern Connecticut State Coll., New Haven. Dept. of Geography.
For primary bibliographic entry see Field 6E.
W76-11972

PROTECTION OF THE MARINE ENVIRONMENT,
National Petroleum Council, Washington, D. C. Committee on Ocean Petroleum Resources.
For primary bibliographic entry see Field 5G.
W76-11982

DISTRIBUTION AND ABUNDANCE OF THE POLYCHAETOUS ANNELIDS IN A SOUTH FLORIDA ESTUARY,
University of South Florida, Tampa. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W76-11987

OFFSHORE SEGMENT OF THE OIL AND GAS EXTRACTION POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11994

LAW OF THE SEA: A STATE MUST EXERCISE SUBSTANTIAL CONTINUOUS AND RECOGNIZED AUTHORITY TO ESTABLISH A BODY OF WATER AS A HISTORIC BAY,
For primary bibliographic entry see Field 6E.
W76-12004

SALT MARSHES-ECOSYSTEMS IN DANGER,
Cape Cod Museum of Natural History, Brewster, Mass.
For primary bibliographic entry see Field 5G.
W76-12016

OCEANS, TECHNOLOGY AND LAW.
Akademiya Nauk SSSR, Moscow. Inst. of State and Law.
For primary bibliographic entry see Field 6E.
W76-12025

FEDERAL JURISDICTION OVER LANDFILLS ON SUB-AQUEOUS LANDS,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12046

USE OF THE 'TRUST DOCTRINE' FOR WETLANDS PROTECTION,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12047

PUBLIC BEACH ACCESS: GUARANTEEING A PLACE TO SPREAD YOUR TOWEL,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.

W76-12053

COASTAL ZONE MANAGEMENT IN FLORIDA: THE NEED FOR A COMPREHENSIVE PROGRAM,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12055

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

WATER TREATMENT DEVICE WITH TRANSISTORIZED CIRCUIT,
Water Technology Service, Inc., Cleveland, Ohio. (Assignee).
For primary bibliographic entry see Field 5F.
W76-11833

3B. Water Yield Improvement

LIQUID LIFTING AND STORAGE APPARATUS AND METHOD,
B. Y. Cotton.
U.S. Patent No. 3,958,424, 3 p, 4 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 946, No 4, p 1509, May 25, 1976.

Descriptors: *Patents, Groundwater, *Groundwater resources, *Water supply, *Moisture availability, Runoff, Capillary flow, Capillary action, Water storage, Water resources development, Irrigation, *Water sources, *Water yield improvement.
Identifiers: Lifting groundwater.

Moisture in cultivated fields, orchards is largely dissipated by absorption into the earth and/or evaporation. A great amount of rainfall is lost due to the fact that during any substantial rainfall, the soil soon becomes saturated and subsequent rainfall is lost by runoff. Therefore, it is the primary object of this invention to provide new and improved methods and apparatus for lifting and retaining ground water in agricultural and other environments. Specifically the invention comprises a planar horizontal flat supporting base of brick, sand, concrete or tile normally embedded below ground level providing support for a lifting and storing unit consisting of one or more vertically oriented webs of glass or the like formed in a spiral of equidistantly closely spaced adjacent convolutions. Adjacent convolutions are closely spaced together so that the capillary effect between adjacent faces of the convolutions serves to lift water upward between the convolutions to a height above its normal level determined by the spacing of the convolutions and the material from which they are formed. The inner extent of the lifting and storing unit consists of a central core cylinder and the outer extent consists of a peripheral cylinder coaxial with the core cylinder with the spiral web or webs extending between the outer surface of the central core cylinder and the inner surface of the outer peripheral cylinder. The spiral web or webs can be of a number of desired materials having a low wetting angle such as glass, ceramic material or the like. (Sinha - OEIS)
W76-11840

PROJECT SKYWATER, A PROGRAM OF RESEARCH IN PRECIPITATION MANAGEMENT, VOLUME I OF II (DRAFT ENVIRONMENTAL STATEMENT).
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
Report INT DES 76-10, Volume I, March 5, 1976. 271 p, 40 fig, 39 tab.

Descriptors: *Weather modification, *Cloud seeding, *Water resources, *Environmental effects, Cloud physics, Water resources development, Rainfall, Snowfall, Precipitation(Atmospheric), Water management(Applied), Water supply, Clouds, Mountains, Agriculture, Projects, Meteorology.
Identifiers: *Environmental impact statements.

Project Skywater is a research cloud seeding effort designed to remove scientific uncertainties and develop the technology required to make cloud seeding a scientifically sound and socially acceptable water resources management tool. The field seeding experiments have been conducted thus far at selected sites in the Western States. Supporting studies are conducted throughout the nation, but mostly in the West. Field experiments are conducted in the mountains during the winter and in the plains during the summer. The primary impact of the program's research activities are insignificant, believed to be a slight but unidentifiable increase in plant growth and stream discharge. If the technology anticipated to be developed from the program is applied continuously over wide areas, the impact would be significant in increased agricultural plant growth and in increased streamflow from mountainous regions. The incidence of avalanche occurrence probably would be increased. Research to date has failed to identify adverse impacts related to seeding agents or significant adverse effects related to managed precipitation. Alternatives considered were termination of project, expansion of conventional water resources engineering, exploitation of groundwater resources, interbasin diversion, desalinization, reuse of degraded water, and land management for increased water yield. (See also W76-11869) (Sims-ISWS)
W76-11868

PROJECT SKYWATER, A PROGRAM OF RESEARCH IN PRECIPITATION MANAGEMENT, VOLUME II OF II (DRAFT ENVIRONMENTAL STATEMENT).
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
Report INT DES 76-10, Volume II, March 5, 1976. 191 p, 25 fig, 70 tab, 242 ref.

Descriptors: *Weather modification, *Cloud seeding, *Environmental effects, Hydrology, Meteorology, Ecology, Agriculture, Economics, Social aspects, Social impact, Projects, Mountains, Hydrologic cycle, Rainfall, Snowfall, Precipitation(Atmospheric), Water resources.
Identifiers: *Environmental impact statements, *High plains, Seeding agents.

Volume II of the Project Skywater Draft Environmental Statement consists of 10 appendixes. Included are descriptions of the hydrologic cycle, condensation, precipitation in the atmosphere, seeding agents, and the Sierra Cooperative Pilot Project. Other appendixes describe the High Plains. Hydrometeorological, ecological, agricultural, economic, and social descriptions are presented. Also included is a bibliography and a glossary. (See also W76-11868) (Sims-ISWS)
W76-11869

EARTH'S HIDDEN ASSET, OUR MOST VALUABLE SOURCE OF WATER IS ALSO THE MOST VULNERABLE,
For primary bibliographic entry see Field 4B.
W76-11895

EFFECT OF COAL MULCH ON CROP YIELDS,
Agricultural Research Service, Cheyenne, Wyo.
For primary bibliographic entry see Field 3F.
W76-11926

3C. Use Of Water Of Impaired Quality

THE ENVIRONMENTAL AND SOCIOLOGICAL IMPACT OF RECYCLING OF AGRICULTURAL WASTE BY LAND USE,
Green Valley Farms, Avondale, Pa.
For primary bibliographic entry see Field 5D.
W76-11641

IRRIGATION OF LEASED FARMLAND WITH TREATED WASTEWATER,
Hickok (Eugene A) and Associates, Wayzata, Minn.
For primary bibliographic entry see Field 5D.
W76-11667

3D. Conservation In Domestic and Municipal Use

URBAN DRAINAGE - PROBLEMS AND POSSIBILITIES,
Nova Scotia Technical Coll., Halifax. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W76-11648

THE SYMBIOTIC APPROACH TO WATER REUSE IN ST. PETERSBURG, FLORIDA,
Black, Crow and Eidsness, Inc., Clearwater, Fla.
For primary bibliographic entry see Field 5D.
W76-11656

SOLID WASTE, SEWAGE, AND ENERGY - A SYMBIOTIC APPROACH,
Energy Management Group, New York.
For primary bibliographic entry see Field 5D.
W76-11657

PROJECT CURE,
Environmental Protection Agency, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W76-11661

SOURCES AND POTENTIAL USES OF SALVAGEABLE WATERS IN ARIZONA URBAN REGIONS,
Arizona Water Resources Research Center, Tucson.
For primary bibliographic entry see Field 5D.
W76-11663

BENEFICIAL USE OF INDUSTRIAL WASTES IN MUNICIPAL WASTEWATER TREATMENT PLANTS,
Greeley and Hansen, Chicago, Ill.
For primary bibliographic entry see Field 5D.
W76-11668

RESERVOIR EFFECTS ON PROPERTY VALUES ACCORDING TO LOCATION AND RURAL VS. URBAN USE,
Kentucky State Univ., Frankfort. School of Public Affairs.
For primary bibliographic entry see Field 4A.
W76-11708

3E. Conservation In Industry

PRACTICAL APPLICATIONS OF SPACE SYSTEMS, SUPPORTING PAPER 6, EXTRACTABLE RESOURCES.
National Research Council, Washington, D. C. Panel on Extractable Resources.
For primary bibliographic entry see Field 4A.

W76-11759

POTENTIAL PUMPED STORAGE PROJECTS IN THE PACIFIC SOUTHWEST.
Federal Power Commission, Washington, D.C. Bureau of Power.
For primary bibliographic entry see Field 8C.
W76-11764

WATER POLLUTION CONTROL ACT OF 1972, ECONOMIC IMPACTS, MEAT PRODUCTS,
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5G.
W76-11779

WATER POLLUTION CONTROL ACT OF 1972, REGIONAL IMPACTS, YELLOWSTONE RIVER BASIN.
Stevens, Thompson and Runyan, Inc. Seattle, Wash.
For primary bibliographic entry see Field 5G.
W76-11789

WATER POLLUTION CONTROL ACT OF 1972, ECONOMIC IMPACTS, DAIRY PRODUCTS.
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5G.
W76-11801

WATER POLLUTION CONTROL ACT OF 1972, ECONOMIC IMPACTS, FOREIGN TRADE,
Public Research Inst., Arlington, Va.
For primary bibliographic entry see Field 5G.
W76-11802

WATER POLLUTION CONTROL ACT OF 1972, ECONOMIC IMPACTS, FRUITS AND VEGETABLES.
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5G.
W76-11803

WATER POLLUTION CONTROL ACT OF 1972, TECHNOLOGIES AND ECONOMIC IMPACTS, THE FEEDLOT INDUSTRY,
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5G.
W76-11804

WATER POLLUTION CONTROL ACT OF 1972, DEMOGRAPHIC AND QUANTITATIVE ANALYSIS,
Human Resources Planning Inst., Seattle, Wash.
For primary bibliographic entry see Field 5G.
W76-11805

INTERIM REPORT, COOPERATIVE GRAYS HARBOR SURVEILLANCE PROGRAM-1970,
Washington State Dept. of Ecology, Olympia. Office of Technical Services.
For primary bibliographic entry see Field 5D.
W76-11894

PRELIMINARY RESULTS WITH A PILOT PLANT WASTE RECYCLING MARINE-AQUACULTURE SYSTEM,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5D.
W76-11932

INTERSTATE WATER COMPACTS AND MINERAL DEVELOPMENT,
Loble, Picotte and Pauly, Helena, Mont.
H. Loble.
Rocky Mountain Mineral Law Institute, Vol 21, p 777-800 (1975). 24 p, 66 ref.

Descriptors: *Water resources, *Energy, *Energy conversion, *Interstate compacts, *Coal mines, Rivers, State governments, Coordination, Legislation, Water sources, Water law, Water levels, Water utilization, Water yield, Mineral industry, Water demand, Colorado.
Identifiers: *Yellowstone River Compact.

The increasing energy shortage has brought into focus the need to exploit our coal reserves in Montana, Wyoming, North Dakota and South Dakota. Whether gasification or liquifaction is used to change coal into gas or petroleum, large-amounts of water will be needed to make either process work. The Yellowstone River Compact supposedly is equal to the task of judiciously appropriating water for energy needs in this region. However, after examination of this and other water compacts, the author concludes that they are, by and large, hopelessly outdated to meet water demands of mineral development. Overall, any pronounced effort to appropriate large amounts of water will result in extensive letigation and a re-negotiation of the Yellowstone Compact. (Frank-Florida)
W76-11977

EFFLUENT LIMITATIONS GUIDELINES FOR EXISTING SOURCES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS FOR NEW SOURCES FOR THE PAVING AND ROOFING MATERIALS (TARS AND ASPHALT) POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11989

POLLUTION CONTROL IN MEAT, POULTRY AND SEAFOOD PROCESSING,
For primary bibliographic entry see Field 5D.
W76-12146

3F. Conservation In Agriculture

AGRICULTURAL ENGINEERING WATER RESOURCES INFORMATION RETRIEVAL OF PUBLISHED LITERATURE,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 10D.
W76-11691

ESTIMATING STOCK WATER USE IN RURAL WATER SYSTEMS,
Burns and McDonnell, Kansas City, Mo.
R. S. Schulz, and T. A. Austin.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY1, Proceedings Paper 11843, p 15-28, January 1976. 14 fig, 2 tab, 12 ref. OWRT A-048-IA (5).

Descriptors: *Agriculture, *Stock water, *Water demand, *Iowa, Livestock, Water utilization, Design criteria, Regional development, Water supply, Air temperature, Rural areas, Farms, Correlation analysis.

Recently there has been an increase in the number of regional water supply systems in the Midwest. These systems often serve large livestock populations in addition to the domestic needs within the region. Peak use periods in a rural water supply system with large livestock populations are longer than those seen in high density residential areas. The increased length of peak use can be attributed to livestock feeding operations, but it is not possible to distinguish between the domestic and livestock influences at any particular time. Peak rates of use were found to occur between 7 a.m. and 11 a.m. and 4:30 p.m. and 8:30 p.m. The nomographs indicating daily livestock water consumption developed from data collected in the literature appeared to give reasonable predictions of livestock water requirements based on animal weight and average temperature (Sims-ISWS)
W76-11696

IRRIGATION WITH CITRUS WASTE WATER,
Agricultural Research and Education Center, Lake Alfred, Fla.
For primary bibliographic entry see Field 5D.
W76-11699

OVERLAND FLOW PRETREATMENT OF WASTEWATER,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W76-11775

PIVOT SPRINKLER,
H. R. Farris, and C. J. Johnson.
U.S. Patent No. 3,957,204, 8 p, 13 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 946, No 3, p 1093, May 18, 1976.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, *Irrigation practices, *Irrigation efficiency, Water conveyance, Water distribution(Applied), Application equipment.
Identifiers: *Pivot sprinkler.

A pivot sprinkler incorporates an elongate irrigation pipe having a number of sprinklers for irrigating a land area. The pipe is supported by spaced supporting towers each of which is provided with supporting wheels and a drive mechanism. One end of the pipe is rotatably supported from and connected to a standpipe. Controls are provided for retaining the support towers generally in aligned conditions with the elongate pipe extending through the rotational center and forming rotational support for a drive wheel on each of the towers. Each wheeled unit includes a smaller trailing wheel oriented to the rear of the drive wheel and connected to the irrigation pipe by a frame structure for transmitting driving torque exerted by the drive wheel to the ground surface and stabilizing the wheeled unit. Spray nozzles are mounted so that they will discharge water to the rear of the machine leaving the wheel traction area relatively dry. (Sinha - OEIS)
W76-11829

SPRINKLER,
R. B. Costa.
U.S. Patent No. 3,957,205, 7 p, 9 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 946, No 3, p 1093, May 18, 1976.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, *Irrigation practices, *Irrigation efficiency, Irrigation operation and maintenance, Application equipment.

A sprinkler head is fixed to a tubular spindle which is rotatably journaled in and spring biased upward relative to a bearing sleeve, and has improved upper and lower seals for sealing the clearance space between the spindle and bearing sleeve against the entrance of water, dirt, grit and the like. The upper seal includes a seal ring which is retained by the spring in sealing force on the sprinkler head and has a depending annular flexible sealing lip surrounding and engaging a circumferential sealing surface on the bearing sleeve in such a way that if the spindle presses downward through the bearing sleeve against spring action, the seal ring wipes or scrapes dirt and grit from the sealing surface to prevent jamming of the seal ring during the upward spring return of the spindle. The lower seal, which serves also as a spindle thrust bearing, is particularly useful on a water actuated impulse sprinkler and includes a carbon-graphite

seal ring cushioned between resilient seal rings for providing the friction necessary for proper operation of the water actuated impulse driving means of the sprinkler. (Sinha - OEIS)
W76-11830

LIQUID LIFTING AND STORAGE APPARATUS AND METHOD,
For primary bibliographic entry see Field 3B.
W76-11840

WATER DISCHARGE DEVICE FOR USE WITH IRRIGATION SYSTEMS,
Hitachi Chemical Co. Ltd., Tokyo (Japan). (Assignee).
S. Watanabe.
U.S. Patent No. 3,958,761, 5 p, 5 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 946, No 4, p 1624, May 25, 1976.

Descriptors: *Patents, *Irrigation, *Surface irrigation, *Irrigation systems, *Irrigation practices, *Irrigation efficiency, Water distribution(Applied), Application equipment, Water pressure, Fertilization, Discharge(Water).

A water discharge device for use with irrigation systems comprises a tubular element formed with female threads at the inside surface and a screw element formed with male threads at the outside surface. The male threads are adapted to engage with the female threads so that the height of the female threads is different from that of the male threads. Since the height of the female threads is different from that of the male threads, a helical clearance is left between the engaging threads providing a pressure reducing passage for the water supplied at a relatively high pressure to be moderately discharged. The fluctuations of the flow rate due to deformations of the elements of the water discharge device under application of a fluctuating hydraulic pressure are avoided. The pressure reduction through the helical passage can be easily controlled by adjusting the depth of engagement between the tubular element and the screw element by turning one relative to the other. (Sinha-OEIS)
W76-11843

THE INFLUENCE OF SOIL WATER CONTENT ON THE UPTAKE OF IONS BY ROOTS: II. CHLORIDE UPTAKE AND CONCENTRATION GRADIENTS IN SOIL,
Nottingham Univ. (England). School of Agriculture.
For primary bibliographic entry see Field 2G.
W76-11925

EFFECT OF COAL MULCH ON CROP YIELDS,
Agricultural Research Service, Cheyenne, Wyo.
M. L. Fairbourn.
Agron J. 66(6), p 785-789, 1974.

Descriptors: *Crop production, *Mulching, *Coal, Colorado, Soil water, Soil temperation, *Evaporation control, Porosity.

A study was conducted at Fort Collins, Colorado to determine if a mulch of 1.0 to 3.0 -cm diameter coal pieces would reduce evaporation of soil water and increase soil temperature. Treatments of coal mulch and bare soil were used in both laboratory and field experiments to determine not only the effects on soil water and soil temperature, but also soil fertility and light regime for plants. The coal pieces broke down rapidly and became intergrated with the surface soil. The experimental methods showed that the coal mulch effects on soil fertility and light regime were negligible. However, the mulch increased soil water storage compared with a bare soil. The response appeared to be due to a change in soil porosity of the surface, wetting depth and soil cracking. Increased soil temperature seemed to be the dominant factor that caused a prominent plant response from a coal mulch. Plants on the coal mulch plots became established rapidly, grew vigorously, and matured early which resulted in higher yields than those from a bare soil treatment. The experiment indicated that low grade coals, soft coals, or coal-soil mixtures can be used to increase production from agricultural and horticultural plants.--Copyright 1975, Biological Abstracts, Inc.
W76-11926

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

URBAN DRAINAGE - PROBLEMS AND POSSIBILITIES,
Nova Scotia Technical Coll., Halifax. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W76-11648

LOWER WALLER CREEK MASTER IMPROVEMENT PLAN,
Taniguchi, Shefelman, Vackar, and Minter, Austin, Tex.
For primary bibliographic entry see Field 5D.
W76-11662

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART II. PACIFIC SLOPE BASINS IN CALIFORNIA--VOLUME I. BASINS FROM TIJUANA RIVER TO SANTA MARIA RIVER,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W76-11669

FLOOD HYDROLOGY OF BUTTE BASIN 1973 AND 1974 WATER YEARS, SACRAMENTO VALLEY, CALIFORNIA--A PROGRESS REPORT,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2E.
W76-11670

MAP SHOWING SELECTED EXTREME-STREAMFLOW STATISTICS AND DRAINAGE AREAS, GREATER PITTSBURGH REGION, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 7C.
W76-11671

MANUAL FOR ESTIMATING FLOOD CHARACTERISTICS OF NATURAL-FLOW STREAMS IN COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2E.
W76-11672

FLOODS OF MAY-JULY 1975, ALONG THE CONTINENTAL DIVIDE IN MONTANA,
Geological Survey, Helena, Mont.
For primary bibliographic entry see Field 2E.
W76-11675

A LAND USE AND LAND COVER CLASSIFICATION SYSTEM FOR USE WITH REMOTE SENSOR DATA,
Geological Survey, Reston, Va.
J. R. Anderson, E. E. Hardy, J. T. Roach, and R. E. Witmer.
Available from Supt. of Documents, GPO, Wash., D. C. 20402 price $0.75. Professional Paper 964, 1976. 28 p, 4 fig, 4 tab, 46 ref.

Descriptors: *Land classification, *Land use, *Remote sensing, Federal government, State governments, Data collections, Aerial photography, Aircraft, Satellites(Artificial), Land development, Urbanization, Agriculture, Forests, Wetlands, Tundra, Water, Ranges, Arid lands, Snow, Ice.
Identifiers: *Land cover classification.

The framework of a national land use and land cover classification system is presented for use with remote sensor data. The classification system has been developed to meet the needs of Federal and State agencies for an up-to-date overview of land use and land cover throughout the country that will be receptive to data from satellite and aircraft remote sensors. The proposed system uses the features of existing widely used classification systems that are amenable to data derived from remote sensing sources. It is intentionally left open-ended so that Federal, regional, State, and local agencies can have flexibility in developing more detailed land use classification. Revision of the land use classification system as presented in U. S. Geological Survey Circular 671 was undertaken in order to incorporate the results of extensive testing and review of the categorization and definitions. (Woodard-USGS)
W76-11679

SOIL SLIPS, DEBRIS FLOWS, AND RAINSTORMS IN THE SANTA MONICA MOUNTAINS AND VICINITY, SOUTHERN CALIFORNIA,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2E.
W76-11680

SEEPAGE STUDY OF THE ROCKY POINT CANAL AND THE GREY MOUNTAIN-PLEASANT VALLEY CANAL SYSTEMS, DUCHESNE COUNTY, UTAH,
Geological Survey, Salt Lake City, Utah.
R. W. Cruff, and J. W. Hood.
Utah Department of Natural Resources, Salt Lake City, Technical Publication No 50, 1976. 53 p, 19 fig, 4 plates, 5 tab, 3 ref.

Descriptors: *Canal seepage, *Water loss, *River systems, Hydrology, *Utah, Data collections, Stage-discharge relations, Hydrologic data.
Identifiers: Duchesne County(Utah), Rocky Point canal system, Grey Mountain-Pleasant Valley canal system.

A study of the gains or losses of the Rocky Point Canal System and the Grey Mountain-Pleasant Valley canal system, Duchesne County, Utah, was made to aid in the water allocation of the canal systems. Four sets of seepage runs were made along each of the canals from May 1972 to June 1973. Adjustments for fluctuations in flow in the canals were made from information obtained from water-stage recorders operated at selected locations along the canal during the time of each seepage run and from a time-of-travel study. Although significant gains and losses were found for specific reaches of the canals, the net loss for the Rocky Point Canal system, which is 96,800 ft in length, amounted to 3.4 cubic feet per second (cfs) or about 6 percent of the capacity of the canal. The net loss for the Grey Mountain-Pleasant Valley Canal system, which is 160,300 ft in length, was 24.5 cfs or about 8 percent of the canal's capacity. Qualitative evaluation of the geohydrology of the study area indicates an estimated return of canal loss to the river system of about 20 percent, or 5.6 cfs. (Woodard-USGS)
W76-11682

INDEX OF CURRENT WATER RESOURCES PROJECTS AND DATA COLLECTION ACTIVITIES IN OHIO, WATER YEAR 1976,
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 7C.
W76-11685

SIMULATED EFFECTS OF THE PROPOSED NARROWS RESERVOIR ON THE WATER-TABLE AQUIFER ALONG THE SOUTH PLATTE RIVER, MORGAN COUNTY, COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W76-11687

EARLY DETECTION AND CORRECTION OF SINKHOLE PROBLEMS IN ALABAMA, WITH A PRELIMINARY EVALUATION OF REMOTE SENSING APPLICATIONS,
Geological Survey, Tuscaloosa, Ala.
For primary bibliographic entry see Field 7B.
W76-11688

EFFECT OF ATMOSPHERIC STABILITY ON WATER TEMPERATURE PREDICTIONS FOR A THERMALLY LOADED STREAM,
Pennsylvania State Univ., University Park. School of Forest.
For primary bibliographic entry see Field 5B.
W76-11690

ON THE JOINT DISTRIBUTION OF THE LARGEST FLOOD AND ITS TIME OF OCCURRENCE,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2E.
W76-11694

TRADE-OFF BETWEEN MODELS AND INFORMATION IN RIVER BASIN PLANNING,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources; and Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.
L. Duckstein.
In: Symposium on the Hydrologic Systems Aspects of Water Resources Planning - Water Resources Problems - Hydrologic Analysis in Perspective, Fall annual meeting of the American Geophysical Union, December, 1974, San Francisco, California, 20 p. 1 fig, 34 ref, append. OWRT B-043-ARIZ(3).

Descriptors: *Planning, *Coordination, *Data collections, *Model studies, *Decision making, Water resources development, River basin development, Evaluation, Input-output analysis, Systems analysis, Operations research, Performance, Resources.

Water resources development usually requires at least 3 groups of people: one group gathers data, one conceives models, and the third makes decisions. Ideally, these 3 groups should work together, but it often happens that they work in a compartmentalized manner. This paper presents a 5-step methodology for problem definition which leads to a logical interconnection between decisions, models, and data. Step 1 defines input-output; the input set consists of elements such as rainfall, floods, pollution, etc., while output involves elements that can be controlled, such as power production or water quantity or quality. In step 2, performance variables, indices, and ordering are defined. Step 3 examines resource indices and ordering for design implementation; the type and quantity of resources to be utilized by a given system are evaluated. The fourth step is designed for the case when conflicts arise between ordering (or performance ranking) of two different systems, which leads to a trade-off ordering. The fifth step is a test plan describing how a system will be evaluated in space and time. (Robinett-Arizona)
W76-11702

FLOOD CONTROL DESIGN WITH LIMITED DATA - A COMPARISON OF THE CLASSICAL AND BAYESIAN APPROACHES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
E. F. Wood.
In: Design of Water Resources Projects with Inadequate Data, Vol. 1, Proceedings of the Madrid Symposium, June 1973; Unesco - WMO - IAHS, Unesco - OMM - AISH, 1974, p 469-483. 2 fig, 1 tab, 19 ref. OWRT C-4118(9021)(13).

Descriptors: *Flood control, *Design, *Probability, Water resources, Planning, Decision making, Hydrology, Economics, Rivers, Streamflow, Methodology, Costs, Damages, Equations, Mathematical models, Systems analysis.
Identifiers: *Bayesian analysis, Classical approach, Limited data.

Water resource planners usually design flood control structures by choosing an extreme value model. The model's parameters are estimated from the available streamflow data and design decisions are made by finding the discharge related to a particular level of risk. In most design problems, the data on extreme events is severely limited, making parameter estimation difficult. Two different parameter estimation approaches are investigated--classical and Bayesian--which are applied to a flood design problem for a northeastern U.S. river. The classical approach uses the maximum liklihood criterion for parameter estimation. The Bayesian approach is performed for objective prior information based upon observations from other rivers and for subjective prior information derived by considering the effect of river basin development upon flood discharges. The results indicate that the classical and Bayesian approaches lead to different design discharges for the same level of risk. (Bell-COrnell)
W76-11703

A METHODOLOGY FOR EVALUATING DEVELOPMENT-ENVIRONMENTAL CONFLICTS ON WILD AND SCENIC RIVERS,
Idaho Univ., Moscow. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6G.
W76-11707

RESERVOIR EFFECTS ON PROPERTY VALUES ACCORDING TO LOCATION AND RURAL VS. URBAN USE,
Kentucky State Univ., Frankfort. School of Public Affairs.
C. M. Vaughan, and D. M. Soule.
Water Resources Bulletin, Vol. 11, No. 6, p 1103-1106, December 1975. 2 tab, 5 ref. OWRT A-006-KY(15).

Descriptors: *Reservoirs, Effects, *Water resources development, *Economic impact, *Property values, Market value, Lakes, Flooding, *Kentucky.
Identifiers: Urban, Rural, Covariance analysis, Analysis of variance, Lake Cumberland(Kentucky).

Economic impact of water resources development may be hidden by improper grouping of relevant data, as demonstrated in two studies of real property value changes in the same reservoir area and similar time periods. Using market values for the period 1955-65, changes in total value of real property in a 12-county group in the Lake Cumberland, Kentucky area were not significantly different from value changes in five other 12-county groups, selected without reference to water resource development. But significant differences were discovered in the period 1950-64 with smaller groups of counties studied according to rural or urban property and location relative to the lake. Covariance analysis of annual property values regressed on time showed that, for rural property, greatest value increases were in the shoreline group, whereas for urban property, greatest value increases were in the shoreline group, whereas for urban property, greatest value increases were in the flood-protected group. These two studies are briefly described and their results are interpreted. (Bell-Cornell)
W76-11708

DEVELOPMENT OF AN AIRBORNE LASER BATHYMETER,
National Aeronautics and Space Administration, Wallops Island, Va. Wallops Flight Center.
For primary bibliographic entry see Field 7B.
W76-11755

PRACTICAL APPLICATIONS OF SPACE SYSTEMS.
National Research Council, Washington, D. C. Space Applications Board.
National Academy of Sciences, Washington, D. C., 1975. 67 p, 2 append. NASA NSR 09-012-016.

Descriptors: *Remote sensing, *Satellites(Artificial), Weather, Climates, Land use, Planning, Agriculture, Forests, Ranges, Surface waters, Lakes, Water resources, Natural resources, Oceans, Water quality, Communication.
Identifiers: *Space Shuttle system.

In November 1973, the National Aeronautics and Space Administration (NASA) asked the National Academy of Engineering to conduct a summer study of future applications of space systems, with particular emphasis on practical approaches, taking into consideration socioeconomic benefits. In December 1973, the Academy agreed to perform the study and assigned the task to the Space Applications Board (SAB). A representative group of users and potential users conducted an intensive two-week study to define user needs that might be met by information or services derived from earth-orbiting satellites. This work was done in July 1974 at Snowmass, Colorado. Subsequently, the SAB reviewed the work of this group, evaluated its findings, and prepared this report, which presents the SAB's own conclusions and recommendations. For the study, user-oriented panels were formed, comprised of present or potential public and private users, including businessmen, state and local government officials, resource managers, and other decision-makers. A number of scientists and technologists also participated, functioning essentially as expert consultants. The conclusions of the study were founded on the resulting statements of needs, as expressed by the user community, in light of considerations of practicability provided by space technologists. The study was designed to provide an opportunity for knowledgeable and experienced users, expert in their fields, to express their needs for information or services which might (or might not) be met by space systems, and to relate the present and potential capabilities of space systems to their needs. (See also W76-11257 thru W76-11760) (Sims - ISWS)
W76-11756

PRACTICAL APPLICATIONS OF SPACE SYSTEMS, SUPPORTING PAPER 3, LAND USE PLANNING.
National Research Council, Washington, D. C. Panel on Land Use Planning.
National Academy of Sciences, Washington, D. C., 1975. 55 p, 3 fig, 3 tab, 1 append. NASA NSR 09-012-106.

Descriptors: *Remote sensing, *Satellites(Artificial), *Land use, *Planning, Aerial photography, Surveys, Mapping, Land classification, Land development, Land resources, Land

management, Forests, Urbanization, Economics, Resources, Conservation.
Identifiers: *ERTS, *Space Shuttle system.

In November 1973, the National Aeronautics and Space Administration (NASA) asked the National Academy of Engineering to conduct a summer study of future applications of space systems, with particular emphasis on practical approaches, taking into consideration socioeconomic benefits. In December 1973, the Academy agreed to perform the study and assigned the task to the Space Applications Board (SAB). For the study, nine user-oriented panels were formed, comprised of present or potential public and private users, including businessmen, state and local government officials, resource managers, and other decision-makers. A number of scientists and technologists also participated, functioning essentially as expert consultants. The Panel on Land Use Planning was comprised of persons who have been involved in remote sensing, processing of the data acquired, and actual utilization in the field of remotely sensed information. Thus, the group was multidisciplinary in terms of the technology involved, the application of such technology, and the perception of the future utilization of remote sensing in land use planning. (See also W76-11756) (Sims - ISWS)
W76-11757

PRACTICAL APPLICATIONS OF SPACE SYSTEMS, SUPPORTING PAPER 5, INLAND WATER RESOURCES.
National Research Council, Washington, D. C. Panel on Inland Water Resources.
National Academy of Sciences, Washington, D. C., 1975. 77 p, 3 tab, 21 ref, 3 append. NASA NSR 09-012-106.

Descriptors: *Remote sensing, *Satellites(Artificial), *Lakes, *Surface waters, Rivers, Bodies of water, Estuaries, Mapping, Planning, Water resources, Surveys, Floods, Soil moisture, Turbidity, Water pollution, Suspended solids, Snow, Ice, Ice cover, Snow cover, Groundwater resources, Salinity, Runoff.
Identifiers: *Inland waters.

In November 1973, the National Aeronautics and Space Administration (NASA) asked the National Academy of Engineering to conduct a summer study of future applications of space systems, with particular emphasis on practical approaches, taking into consideration socioeconomic benefits. In December 1973, the Academy agreed to perform the study and assigned the task to the Space Applications Board (SAB). For the study, nine user-oriented panels were formed, comprised of present or potential public and private users, including businessmen, state and local government officials, resource managers, and other decision-makers. A number of scientists and technologists also participated, functioning essentially as expert consultants. The primary objective of the Panel on Inland Water Resources was established as determining how and to what extent space technology can be used in the timely development and improved management of the nation's inland water resources. The term 'space technology' refers to a system or systems which may include satellites, high-altitude aircraft, and ground installations with attendant sensors that remotely measure various parameters and collect ground-based data and relay them via satellite to processing centers. Emphasis has been placed on user applications which the panel believes will arise within the next decade. (See also W76-11756) (Sims - ISWS)
W76-11758

PRACTICAL APPLICATIONS OF SPACE SYSTEMS, SUPPORTING PAPER 6, EXTRACTABLE RESOURCES.
National Research Council, Washington, D. C. Panel on Extractable Resources.
National Academy of Sciences, Washington, D. C., 1975. 22 p, 2 fig. NASA NSR 09-012-106.

Descriptors: *Remote sensing, *Satellites(Artificial), *Natural resources, *Land resources, Industries, Mineral industry, Mining, Fuels, Fossil fuels, Coals, Oil, Earth materials, Construction materials, Surveys, Mapping, Geology, Geologic mapping.
Identifiers: *Extractive resources, Extractive industries.

In November 1973, the National Aeronautics and Space Administration (NASA) asked the National Academy of Engineering to conduct a summer study of future applications of space systems, with particular emphasis on practical approaches, taking into consideration socioeconomic benefits. In December 1973, the Academy agreed to perform the study and assigned the task to the Space Applications Board (SAB). For the study, nine user-oriented panels were formed, comprised of present or potential public and private users, including businessmen, state and local government officials, resource managers, and other decision-makers. A number of scientists and technologists also participated, functioning essentially as expert consultants. The Panel on Extractable Resources was charged with reviewing the use of information from space systems in the operation of the extractive industries, particularly in exploration for mineral and fuel resources. The conclusions and recommendations presented were based on the premise that the survival of modern industrial society requires a continuing, secure flow of resources for energy, construction and manufacturing, and for use as plant foods. Discovery of the volumes and qualities of the great variety of earth resources needed to sustain this flow will tax the scientific and engineering ingenuity of industry and government. Data from space systems will provide an important addition to information generated from aircraft-mounted sensors and ground field studies. (See also W76-11756) (Sims - ISWS)
W76-11759

PRACTICAL APPLICATIONS OF SPACE SYSTEMS, SUPPORTING PAPER 7, ENVIRONMENTAL QUALITY.
National Research Council, Washington, D. C. Panel on Environmental Quality.
National Academy of Sciences, Washington, D. C., 1975. 56 p, 1 fig, 9 tab, 3 append. NASA NSR 09-012-106.

Descriptors: *Remote sensing, *Satellites(Artificial), *Environment, Environmental control, Water quality, Air pollution, Water pollution, Industries, Pollutants, Turbidity, Coasts, Oceans, Wetlands, Land use, Public health, Measurement, Sampling, Surveys, Costs, Cost-benefit analysis.

In November 1973, the National Aeronautics and Space Administration (NASA) asked the National Academy of Engineering to conduct a summer study of future applications of space systems, with particular emphasis on practical approaches, taking into consideration socioeconomic benefits. In December 1973, the Academy agreed to perform the study and assigned the task to the Space Applications Board (SAB). For the study, nine user-oriented panels were formed, comprised of present or potential public and private users, including businessmen, state and local government officials, resource managers, and other decision-makers. A number of scientists and technologists also participated, functioning essentially as expert consultants. The Panel on Environmental Quality concerned itself with the potential use of space systems to assist in determining the current state of air, water, and land environments and in monitoring them for the effects of man's activities. The panel elected to narrow its considerations to ways in which space systems might be used to determine: (1) what pollutants are introduced into the major environmental media, (2) what effects of these pollutants are manifested, and (3) the effectiveness of abatement and control actions. Environmental aspects were discussed in relation to: (1) air quality, (2) water quality, (3) land quality as related to land use, and (4) public health. (See also W76-11756) (Sims - ISWS)
W76-11760

UD METHOD OF RESERVOIR FLOOD ROUTING.
Soil Conservation Service, Washington, D.C. Engineering Div.
For primary bibliographic entry see Field 8B.
W76-11761

WATER DRAINAGE FROM HIGHWAY FILLS,
Kansas State Highway Commission, Topeka. Planning and Development Dept.
For primary bibliographic entry see Field 8D.
W76-11762

POTENTIAL PUMPED STORAGE PROJECTS IN THE PACIFIC SOUTHWEST.
Federal Power Commission, Washington, D.C. Bureau of Power.
For primary bibliographic entry see Field 8C.
W76-11764

ENGINEERING USES OF EROS,
Washington Univ., Seattle. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 7B.
W76-11765

EVAPOTRANSPIRATION FROM A SHORT-GRASS PRAIRIE SUBJECTED TO WATER AND NITROGEN TREATMENTS,
Colorado State Univ., Fort Collins. Natural Resource Ecology Lab.
For primary bibliographic entry see Field 2D.
W76-11849

ROUGHNESS EFFECTS ON RECTANGULAR FREE OVERFALL,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W76-11855

PEAK FLOW INTER-ARRIVAL TIMES,
Bristol Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 2A.
W76-11859

WATER RESOURCES AND THEIR DEVELOPMENT IN NIGERIA,
Ibadan Univ. (Nigeria), Dept. of Geography.
J. O. Ayoade.
Hydrological Sciences Bulletin, Vol. 20, No. 4, p 581-591, December 1975. 6 fig, 2 tab, 12 ref.

Descriptors: Water resources, *Subsurface waters, *Surface waters, *Groundwater, *Africa, *Groundwater resources, *Hydrogeology, *Water resources development, Hydrology, Droughts, Hydrologic cycle, Geology, Evapotranspiration, Seasonal.
Identifiers: *Nigeria, *Thornthwaite's formula.

A preliminary assessment is given of Nigeria's surface and underground water resources and discussed the relevant meteorological, hydrological and hydrogeological factors which determine the magnitude and spatial pattern of the distribution of these resources. It was pointed out that the present uncoordinated and piecemeal development of Nigeria's water resources stems from lack of a national water policy and an adequate institutional framework for managing these resources. Two solutions were suggested. One is that the Federal Government should as a matter of urgency establish a National Water Resources Board

charged with rational planning, management and development of the country's water resources. The other is that a training program should be established to produce the necessary skilled manpower in the field of water resources. (Terstriep - ISWS)
W76-11860

AN ANALYSIS OF WATER FLOW IN DRY SNOW,
Cold Regions Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 2C.
W76-11865

ANALYSIS OF HYDROLOGIC RESPONSE TO RAIN-ON-SNOW,
Cold Regions Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 2C.
W76-11866

DEVELOPMENT OF THE UNIVERSITY OF HAWAII-MANOA STREAM GAGING STATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
Y. S. Fok, and R. H. F. Young.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-257 061, $3.50 in paper copy, $3.00 in microfiche. Technical Memorandum Report No. 48, May 1976. 18 p, 9 fig, 3 tab, 3 ref. OWRT A-056-HI(1). 14-31-0001-5011.

Descriptors: *Streamflow, *Runoff, Urban hydrology, Hawaii, *Gaging stations, *Stream gages, Water quality, Measurement, Stage-discharge relations, Instrumentation, Data collections.
Identifiers: *Manoa Valley watershed(HI), Oahu(HI).

Manoa Stream drains the Manoa Valley watershed located near the central part of the Honolulu metropolitan area. Past studies have characterized the streamflow, sediment, and water quality of Manoa Stream. However, the two existing streamflow gaging stations on the stream are located near the head of the valley and none in the downstream section. Hence, there is no good way to correlate the discharge at these gages with the discharge in the downstream sections of the stream. In this study, a permanent stream gaging station was established at a downstream location on the University of Hawaii campus. The development, instrumentation, method of operation, and maintenance of this gaging station are reported. Data obtained from this new University of Hawaii-Manoa Stream Gaging Station will allow meaningful measurements of streamflow and water quality characteristics of Manoa Stream.
W76-11876

THE FUTURE OF THE SAVANNAH RIVER, PROCEEDINGS OF A SYMPOSIUM.
Clemson Univ., S.C. Water Resources Research Inst.
Available from NTIS, Springfield, VA 22161, as PB-257 059, $7.75 in paper copy, $3.00 in microfiche. Held at Hickory Knob State Park, McCormick, SC, by the Water Resources Research Inst., Clemson Univ., in cooperation with Environmental Resources Center, GA Inst. of Tech., and Inst. of Ecology, Univ. of Ga. Oct 14-15, 1975, 211p. B. L. Dillman and J. M. Stepp, Editors. OWRT A-999-SC(6).

Descriptors: *Future planning, *River basin development, Water quality, Electric power, Recreation, Sediments, Natural resources, History, *South Carolina, *Georgia, Rivers.
Identifiers: *Savannah River(SC-Geo).

These proceedings include the major papers and invited discussions presented at the symposium. Major topics include: (1) Historical perspective; (2) Water quality planning and management; (3) Electric power; (4) Recreation; (5) Sediment problems; (6) Environmental resources; and (7) The Corps of Engineers' role. The general format is one of a major presentation followed by two prepared discussions. (Ligon-Clemson University)
W76-11877

ECOSYSTEM MODELING OF WATER-HYACINTH MANAGEMENT IN LAKE ALICE, FLORIDA,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 5G.
W76-11884

SYSTEMS APPROACH FOR THE PLANNING AND MANAGEMENT OF THE MORAVA RIVER BASIN, YUGOSLAVIA,
California Univ., Los Angeles. Dept. of Civil Engineering.
J. A. Dracup, and A. D. Feldman.
Working Paper No. 62, UNDP/UN Interregional Seminar on River Basin and Interbasin Development, Budapest, Hungary, September 1975. 20 p, 3 fig, 3 tab, 4 ref. (United Nations, Department of Economic and Social Affairs).

Descriptors: *Water resources development, *Comprehensive planning, *Computer models, *Project planning, *River basins, Simulation analysis, Optimization, Mathematical models, Systems analysis, Decision making, Feasibility, Hydrologic aspects.
Identifiers: *Morava River basin(Yugoslavia).

The development of a comprehensive master plan for a large-scale water resource system is enhanced by the use of computer based mathematical models for system simulation and optimization. The ultimate use of these hydraulic, hydrologic and water quality models is the formulation of decision and control strategies for the development of an on-line data management and control system for the entire basin. Presented is a case study of the Morava River basin, Yugoslavia, one of several ongoing studies of the Morava by a number of local, federal and international agencies. The Morava River currently requires viable development schemes to alleviate problems of flooding, sedimentation, water supply and water quality. A system description is given, and project objectives and the project plan are discussed. Presented is a comprehensive table of the origin and purpose of models for the Morava River basin; 22 models are considered. Finally, the paper discusses accomplishments to date, including data management, model development and application, and decision and control strategies. (Bell-Cornell)
W76-11886

APPROPRIATION BY THE STATE OF MINIMUM FLOWS IN NEW MEXICO STREAMS,
J. B. Draper.
Natural Resources Journal, Vol 15, p 809-822 (October 1975). 14 p, 70 ref.

Descriptors: *Water allocation(Policy), *New Mexico, *Streams, *Appropriation, *State jurisdiction, Constitutional law, Water law, Water rights, Water resources, Legal aspects, Legal review, Conservation, Headwaters, Wildlife, Prior appropriation, Legislation, State governments.

There are alternatives to prior appropriation, especially where protection of instream values is required. First, the state could withdraw waters from eligibility for appropriation. In New Mexico, a pure appropriation state, this would require a constitutional amendment; but the state engineer could deny new applications and restrict changes in use that reduce return flows. Second, the best method is for the state itself to appropriate waters for instream protection. Legislation should be enacted that would state minimum flows necessary to sustain the riparian habitat and other comparable recreation uses. This method has no constitutional bar to its application. Third, any person, club, or agency could appropriate instream flows, with the beneficial use requirement satisfied by the existence of a recreational purpose. (Frank-Florida)
W76-11899

MINIMUM STREAMFLOW-FEDERAL POWER TO SECURE,
D. A. Grady.
Natural Resources Journal, Vol 15, p 799-807 (October 1975). 9 p, 74 ref.

Descriptors: *Water resources development, *Protection, *Federal jurisdiction, *Headwaters, *Appropriation, Judicial decisions, Water law, Legal aspects, Water resources, Conservation, Wildlife, Wildlife conservation, Navigable waters, Constitutional law, Water rights, Water allocation(Policy), Federal government.

Developers have been appropriating waters recently even up to the headwaters of streams. The result has been a diminution of flow and damage to surrounding wildlife. The federal government has, therefore, been asserting prior rights to instream flows to protect wildlife. Two methods have been used. First, courts have recognized that there is a federal pre-emptive right to all water necessary to fulfill federal land purposes. Headwaters can be protected as being necessary for the support of national forests and parks. Second, the broad federal navigational power can be used as a means to require minimum streamflow. There must only be an incidental navigational purpose for courts to find effective water rights to be lodged in the federal government. (Frank-Florida)
W76-11900

PUBLIC PARTICIPATION IN WATER RESOURCES DEVELOPMENT, A BIBLIOGRAPHY.
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 6B.
W76-11903

BIOLOGICAL CONTROL OF WATER WEEDS WITH PLANT PATHOGENS,
Florida Univ., Gainesville. Dept. of Plant Pathology.
T. E. Freeman, R. Charudattan, K. E. Conway, F. W. Zettler, and R. D. Martyn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-257 172, $4.00 in paper copy, $3.00 in microfiche. Florida Water Resources Research Center, Gainesville, Publication No. 36, June 1976. 39 p, 2 plates, 4 tab, 42 ref. OWRT A-027-FLA(10). 14-34-0001-6010.

Descriptors: *Biocontrol, *Plant pathology, *Aquatic weed control, *Pathogenic fungi, Rusts, Aquatic insects, Water hyacinth, Biomass, Plant diseases, *Florida.
Identifiers: *Cercospora rodmanii, Rhizoctonia solani, Acremonium zonatum, Uredeo eichhorniae, Bipolaris stenospila, Water hyacinth rust, *Rodman Reservoir(Fla).

Both endemic and exotic plant pathogens were evaluated as biological control agents for water weeds. Additional studies investigated the potential use of an integrated program of biological control using plant pathogens and insects. Of the endemic pathogens tested, Rhizoctonia solani, Acremonium zonatum and Cercospora rodmanii exhibited potential as biocontrols. The latter fungus was the most promising. In fact, C. rodmanii

was established as the causal agent of a decline disease which effectively controlled waterhyacinths in Rodman Reservoir in two out of the last five years. It has the additional advantage of being highly host specific for waterhyacinths. The two exotic pathogens showing the most potential were the waterhyacinth rust, Uredeo eichhorniae and Bipolaris stenospila. Results of the integrated control studies showed that the action of a combination of pathogens and insects would significantly reduce biomass accumulation in waterhyacinth populations. (Morgan-Florida)
W76-11904

TIME OF CONCENTRATION OF OVERLAND FLOW,
Nevada Univ., Reno. Center for Water Resources; and Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 2E.
W76-11958

RELATIONS BETWEEN PROJECT ECONOMICS AND HYDROLOGICAL DATA,
Economic Commission for Europe(UN), New York.
For primary bibliographic entry see Field 6B.
W76-11970

OPTIMIZATION OF WATER RESOURCES DEVELOPMENT PROJECTS IN CASE OF INADEQUATE HYDROLOGIC DATA,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 6A.
W76-11971

WATER ALLOCATION IN UTAH--PROTECTION OF INSTREAM USES,
R. A. Kimsey.
Utah Law Review, Vol 1975, p 687-707 (Fall 1975). 21 p, 112 ref.

Descriptors: *Utah, *Appropriation, *Public benefits, *Water shortage, *Water supply, State governments, Legal aspects, Water users, Water utilization, Economic efficiency, Economics, Priorities, Prior appropriation, Riparian rights.

The appropriative water system in Utah has evolved into a market system because water resources are fully appropriated. In Utah, water goes to the most economically profitable user when it does change hands. This emphasis on market value has in the past left instream users empty-handed because their utility in dollar terms was and still is low. This conflict between water for public benefit and water for private economic development is slowly evolving into a balance between the two. The author sees needed legislative changes taking place, but believes they are inadequate in themselves. The judiciary must ensure an equal voice for instream water uses. This can be done most effectively through the public trust doctrine. All competing values could then be considered, not solely the market value of appropriated waterland. (Frank-Florida)
W76-11974

WETLAND'S RELUCTANT CHAMPION: THE CORPS TAKES A FRESH LOOK AT 'NAVIGABLE WATERS',
Lewis and Clark Coll., Portland, Oreg. Northwestern School of Law.
R. W. Haines.
Environmental Law, Vol 6, p 217-241 (Fall 1975). 25 p, 101 ref.

Descriptors: *Federal Water Pollution Control Act, *Navigable waters, *Wetlands, *Federal jurisdiction, *Rivers and Harbors Act, Estuaries, Marshes, Streams, Headwaters, Lakes, Tributaries, Environment, Environmental control, Conservation, Judicial decisions.

With the passage of the Federal Water Pollution Act Amendments of 1972 (FWPCA), the Corps of Engineers received a mandate to supervise a much broader area of 'navigable waters'. This definition was greatly expanded over the previous one in the 1899 Rivers and Harbors Act. The Corps balked at implementing new regulations, but was forced judicially to do so. The new permit system and regulations were implemented only after a fight with the Environmental Protection Agency over greater protection for wetlands. The discharge of dredge and fill is now covered in primary tributaries as well as natural lakes. In addition, by July 1, 1977 the Corps' jurisdiction will be extended up to the headwaters of all streams and tributaries. (Frank-Florida)
W76-11976

INTERSTATE WATER COMPACTS AND MINERAL DEVELOPMENT,
Loble, Picotte and Pauly, Helena, Mont.
For primary bibliographic entry see Field 3E.
W76-11977

THE INTRACOASTAL WATERWAY: AN ECOLOGICAL PERSPECTIVE,
Florida Atlantic Univ., Boca Raton. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5G.
W76-11986

ALASKA NATIONAL INTEREST LANDS.
For primary bibliographic entry see Field 6E.
W76-11995

WATER RESOURCES PLANNING ACT--OVERSIGHT.
For primary bibliographic entry see Field 6E.
W76-11998

WATER MANAGEMENT DURING DROUGHT EVENTS,
Central and Southern Florida Flood Control District, West Palm Beach.
W. V. Storch.
In Depth Report, Vol 2, No 1, p 1-8, April 1974. 8 p, 2 fig.

Descriptors: *Water allocation(Policy), *Droughts, *Florida, Water resources, *Groundwater, Water levels, Water level recorders, *Water management(Applied), Water table, Water supply, Water utilization, Legislation, Aquifers, Water conservation, Water circulation.
Identifiers: *Lake Okeechobee(Fla).

Drought can begin a long time before people feel its effects, since groundwater levels drop before any crisis appears at the surface. Emergency measures with regard to drought should take the form of supply and demand charts, both for surface and groundwater. Once the water manager is satisfied that an emergency is not due to mechanical failure or local circumstances, the only answer is to reduce water usage. Different drought indices are given, as well as a chart showing water supply and demand trends for Lake Okeechobee. (Frank-Florida)
W76-12000

EXAMINATION OF WATER MANAGEMENT ALTERNATIVES IN CONSERVATION AREA 2A.
Central and Southern Florida Flood Control District, West Palm Beach.
In Depth Report, Vol 2, No 3, p 1-12, July-August 1974. 12 p, 5 fig, 4 photo.

Descriptors: *Florida, *Flood plains, *Drawdown, *Ecosystems, *Fishkill, *Wading birds, Detritus, Grasses, Trees, Plant physiology, Plant morphology, Environmental effects, Grasslands, Willow trees, Wildlife, Wildlife habitats, Wildlife conservation, Wildlife management, Drainage effects, Vegetation regrowth, *Water management(Applied).

In 1973 a decision was made to drain Conservation Area 2A in Broward and Palm Beach Counties, Florida. The drawdown was an attempt to reverse some changed ecological conditions in the area and to consolidate compact and dry organic detritus. Studies of the effects of the drawdown indicated that ecological changes would be reversible and that flora and fauna could be restored. When the marsh levels receded, thousands of wading birds, mostly ibis and heron, returned. The result was a very successful rookery in a neighboring area. An associated incident of the drawdown, however, was a fishkill caused primarily by the organic detritus and by overcrowding in available waters. Future kills can be avoided by starting drawdowns much sooner and effecting them more slowly. Vegetation changes resulting from the drawdown included the return of maidencane and break-rush to the area, disappearance of wet prairie growth, with little immediate effect on sawgrass or woody plant. Projections anticipate return of woody growth and of wildlife such as deer and kite. (Comer-Florida)
W76-12003

THE WORLD'S LARGEST WATER PROJECT,
J. Zmuda.
Popular Science, Vol 201, p 62-65 September 1972. 4 p, 2 fig, 1 map, 14 photo.

Descriptors: *California, *Water conveyance, *Aqueducts, *Dams, *Water supply development, Los Angeles Aqueduct, Bodies of water, Channels, Flood control, Water control, Hydroelectric plants, Water management(Applied), Projects, Project planning, Costs, Management, Water policy, Canals, Water utilization, Multiple purpose reservoirs, Water quality, Recreation facilities, Computers.
Identifiers: *California Aqueduct.

The California Aqueduct and the engineering structures comprising the Tehachapi crossing are major elements of the California State Water Project. Other new facilities, which will cost approximately $2.3 billion, will include power plants, aqueduct systems, the highest earthfill dam in the country and mammoth pumping plants. The Project hopefully will assure flood control, clean hydroelectric power, recreational sites and improved fish and wildlife habitats. The Aqueduct begins in northern California and transports water by gravity to various pumping plants. A system of computer monitoring and control centers at five major field divisions regulates over 600 miles of aqueduct canals. All operations are monitored and coordinated by computer. Some of the setbacks which have been encountered and which will have to be solved include: animals falling into the aqueduct; tumbleweeds clogging up trash racks, thereby impeding water flow; valve failures; and labor disputes. (Hadoulias-Florida)
W76-12023

THE SWALE,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12038

NAVIGABLE WATER, A DEFINITION: ALL BENT OUT OF SHAPE,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12039

WATERS: NUMBERLESS YET MEAGER,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12040

PUBLIC SERVITUDE FOR NAVIGATION ON ARTIFICIAL WATERS AND THE COMMERCE CLAUSE,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12044

THE TAKING ISSUE, FLOOD PLAIN AND WETLANDS ZONING,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12049

LEGAL PROBLEMS OF MARINA CONSTRUCTION AND CHANNEL MARKER INSTALLATION IN FLORIDA,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12052

LANDOWNER'S AUTHORITY TO PROTECT PROPERTY ABOVE ORDINARY HIGH WATER LINE FROM SEASONAL FLOODING,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12058

FLOOD CONTROL.
For primary bibliographic entry see Field 6E.
W76-12060

4B. Groundwater Management

SPRING FLOW FROM PRE-PENNSYLVANIA ROCKS IN THE SOUTHWESTERN PART OF THE NAVAJO INDIAN RESERVATION, ARIZONA,
Geological Survey, Cheyenne, Wyo.
For primary bibliographic entry see Field 2F.
W76-11673

A PRELIMINARY EVALUATION OF THE CHEMICAL CHARACTER OF WATER NEAR THE NORTHWEST SHORE OF TOPAZ LAKE, DOUGLAS COUNTY, NEVADA,
Geological Survey, Carson City, Nev.
For primary bibliographic entry see Field 5A.
W76-11674

APPRAISAL OF THE WATER RESOURCES OF CHARLOTTE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4C.
W76-11676

GROUND-WATER LEVELS IN SELECTED BASINS IN THE STATE OF UTAH FROM FEBRUARY-MARCH 1974 TO FEBRUARY-MARCH 1975,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 7C.
W76-11678

GROUND-WATER QUALITY AT THE SITE OF A PROPOSED DEEP-WELL INJECTION SYSTEM FOR TREATED WASTEWATER, WEST PALM BEACH, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5A.
W76-11681

HYDROLOGIC RECONNAISSANCE OF THE PINE VALLEY DRAINAGE BASIN, MILLARD, BEAVER, AND IRON COUNTIES, UTAH,
Geologicsl Survey, Salt Lake City, Utah.
J. C. Stephens.
Utah Department of Natural Resources, Salt Lake City, Technical Publication No 51, 1976. 38 p, 3 fig, 1 plate, 9 tab, 24 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Hydrologic data, *Water quality, *Well data, Hydrogeology, Groundwater movement, Water yield, Groundwater recharge, Springs, Ephemeral streams, *Utah.
Identifiers: *Pine Valley drainage basin(Utah).

The Pine Valley drainage basin is an area of about 730 sq mi in Millard, Beaver, and Iron Counties in southwestern Utah. Total annual precipitation in the basin averages about 410,000 acre-ft. Less than 500 acre-ft of runoff reaches the playa on the lowest part of the valley floor. There is no surface outflow from the basin. Ground-water recharge from precipitation averages about 21,000 acre-ft annually. However, about 3,000 acre-ft of the recharge moves eastward under the topographic divide into the adjacent Wah Wah Valley drainage basin. Many of the 80 known springs in the basin issue from perched zones in extrusive igneous rocks in the Needle Range. Estimated average annual ground-water discharge is about 21,000 acre-ft--650 acre-ft by springs; 940 acre-ft by seepage to streams; 5,500 acre-ft by evapotranspiration; less than 5 acre-ft by pumping from wells; and 14,000 acre-ft (including about 3,000 acre-ft that goes to the Wah Wah Valley drainage basin) that is assumed to be discharged by subsurface outflow to maintain the natural balance between recharge and discharge. All water sampled in the basin was chemically suitable for most existing uses. A list of about 100 Publications of the Utah Department of Natural Resources, Division of Water Rights, is included. (Woodard-USGS)
W76-11683

PRELIMINARY EVALUATION OF THE GROUND-WATER DATA NETWORK IN INDIANA,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 7A.
W76-11684

INDEX OF CURRENT WATER RESOURCES PROJECTS AND DATA COLLECTION ACTIVITIES IN OHIO, WATER YEAR 1976,
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 7C.
W76-11685

PROBABLE EFFECTS OF INCREASING PUMPAGE FROM THE SCHOFIELD GROUND-WATER BODY, ISLAND OF OAHU, HAWAII,
Geological Survey, Honolulu, Hawaii.
R. H. Dale, and K. J. Takasaki.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-253 752, $4.00 in paper copy, $3.00 in microfiche. Water-Resources Investigations 76-47, May 1976. 45 p, 14 fig, 4 tab, 18 ref.

Descriptors: *Groundwater resources, *Pumping, *Drawdown, *Projections, *Hawaii, Aquifer characteristics, Hydrogeology, Groundwater recharge, Groundwater potential, Water yield, Hydrologic budget, Hydrologic data.
Identifiers: Oahu(Hawaii), *Schofield groundwater body(HI), Increased pumping effects.

The Schofield water body occurs near the geographic center of the island of Oahu, Hawaii. Ground-water dams maintain a head of 85 meters within the body, in contrast with the heads of 7.3 meters or less in the adjacent basal-water bodies. Under present development, pumpage from the Schofield water body is small as compared to the total flux, and most of the ground water flows over or through the adjacent ground-water dams into the adjacent basal-water bodies. Increasing pumpage from the Schofield ground-water body will cause a reduction in head in the Schofield ground-water body, and a decrease in the ground-water flux to the adjacent basal-water bodies. Recharge to the Schofield water body is estimated at 481 thousand cubic meters per day, and pumpage averages 28 thousand cubic meters per day. The difference, 453 thousand cubic meters, flows to the adjacent basal-water bodies. Of the difference, more than 80 percent flows south to the Pearl Harbor basal-water body. (Woodard-USGS)
W76-11686

SIMULATED EFFECTS OF THE PROPOSED NARROWS RESERVOIR ON THE WATER-TABLE AQUIFER ALONG THE SOUTH PLATTE RIVER, MORGAN COUNTY, COLORADO,
Geological Survey, Denver, Colo.
A. W. Burns, and J. B. Weeks.
Open-file report 76-379, May 1976. 15 p, 7 fig, 2 tab, 6 ref.

Descriptors: *Model studies, *Pre-impoundment, *Water table, *Surface-groundwater relationships, Computer models, Forecasting, Methodology, Reservoirs, Dams.
Identifiers: Morgan County(Colo), Narrow reservoir(Colo), *South Platte River(Colo).

A computer model was used to estimate the effects of the proposed Narrows Reservoir on the alluvial aquifer adjacent to the South Platte River near Fort Morgan, Colo. Changes in ground-water discharge to the river caused by the proposed reservoir were estimated assuming steady-state conditions. The proposed reservoir was simulated for two different reservoir pool altitudes. For the conditions simulated, the principal effects of the proposed reservoir on the ground-water system would be an increase in water-table altitude in the aquifer and a redistribution of ground-water discharge to the South Platte River. The change in water level at Fort Morgan was less than 1 foot for the two reservoir conditions simulated. No significant change in the ground-water system would occur downstream from Fort Morgan. Groundwater discharge would decrease by 24 cubic feet per second (cfs) above the proposed dam and increase by 24 cfs below the proposed dam for steady-state conditions with the reservoir pool at 4,404 feet. Ground-water discharge would decrease by 11 cfs above the proposed dam and increase by 15 cfs below the proposed dam for steady-state conditions with the reservoir pool at 4,383 feet. (Woodard-USGS)
W76-11687

TRANSIENT SIMULATION OF SALTWATER INTRUSION IN SOUTHEASTERN FLORIDA,
Princeton Univ., N. J. Dept. of Civil Engineering; an Princeton Univ., N. J. Water Resources Program.
For primary bibliographic entry see Field 2L.
W76-11689

STATUS REPORT ON HEAT STORAGE WELLS,
General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
For primary bibliographic entry see Field 5G.
W76-11701

WASTE INJECTION INTO THE HAWAIIAN GHYBEN-HERZBERG AQUIFER: A LABORATORY STUDY USING A SAND-PACKED HYDRAULIC MODEL,
Hawaii Univ., Honolulu. Water Resource Research Center.
For primary bibliographic entry see Field 5B.
W76-11777

MULTIPLE-COMPLETION GEOTHERMAL ENERGY PRODUCTION SYSTEMS,
For primary bibliographic entry see Field 8B.
W76-11828

METHOD OF INHIBITING SCALE FOR HIGH TEMPERATURE STEAM WELLS,
Union Oil Co. of California, Brea. (Assignee).
For primary bibliographic entry see Field 8G.
W76-11842

THE AGE OF GROUNDWATER IN THE CHALK OF THE LONDON BASIN,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 2F.
W76-11848

WATER RESOURCES AND THEIR DEVELOPMENT IN NIGERIA,
Ibadan Univ. (Nigeria), Dept. of Geography.
For primary bibliographic entry see Field 4A.
W76-11860

HYDROLOGICAL STUDIES OF THE SAGINAW FORMATION IN THE LANSING, MICHIGAN AREA - 1962,
Michigan State Univ., East Lansing. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W76-11870

FIELD EVALUATION OF A RECHARGE BASIN,
New York State Dept. of Transportation, Albany. Engineering Research and Development Bureau.
R. J. Weaver, and R. A. Kuthy.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 532, $3.50 in paper copy, $3.00 in microfiche. Report NYSDOT-ERD-75-RR26, February 1975. 17 p, 7 fig, 3 tab.

Descriptors: *Recharge ponds, *Storm water, *Groundwater recharge, Artificial recharge, Pit recharge, On-site investigations, On-site data collections, Inflow, Storm runoff, Water levels, Highways, Soils, Soil mechanics, Soil properties, Infiltration, Data collections, Data processing, Civil engineering.
Identifiers: *Recharge basin tests.

The results are presented of a full-scale field infiltration test performed on a temporary 150- by 35-ft recharge basin, which was inundated by controlled discharge from a 4.5-million gallon storage tank. The data obtained from the test permitted the verification of a basin design method developed in a previous study. The theory developed in the original study was for a constant-head, suddenly applied case and used a value equal to half the maximum head in determining the infiltration rate. This theory and corresponding assumptions were found to lead to a desirable net safety factor of 1.40, as was originally anticipated. As a result of this work, the Soil Mechanics Bureau of the New York State Department of Transportation is preparing a manual covering both design and environmental considerations in using recharge basins. (Sims-ISWS)
W76-11872

AN ECOLOGICAL MODEL FOR HEAVY METAL CONTAMINATION OF CROPS AND GROUND WATER,
Royal Danish School of Pharmacy, Copenhagen.
For primary bibliographic entry see Field 5B.
W76-11885

UNDERGROUND LIQUID WASTE DISPOSAL,
American Society of Civil Engineers, New York. Task Committee on Underground Liquid Disposal.
For primary bibliographic entry see Field 5E.
W76-11888

EARTH'S HIDDEN ASSET, OUR MOST VALUABLE SOURCE OF WATER IS ALSO THE MOST VULNERABLE,
P. W. Quigg.
Audubon, Vol 78, p 126-132, May 1976. 7 p, 1 dwg.

Descriptors: *Groundwater, *Groundwater availability, *Groundwater basins, *Aquifer systems, Aquifer characteristics, Aquifer management, Base flow, Groundwater recharge, Groundwater resources, Oil-water interfaces, Surface-groundwater relationships, Water table, Water supply, Water wells, Watersheds, Water pollution sources, Water pollution effects, Groundwater mining, Groundwater movement, Land subsidence.

Groundwater has been a primary source of useable water for thousands of years. In some areas of the world underground reservoirs are perhaps the only means of survival. In the United States, however, groundwater is currently endangered. In areas of Texas and New Mexico thousands of feet of groundwater are removed each year with recharge measurable in inch franctions. In southern California most aquifers are already dry. Besides depleting a non-renewable resource, over pumping can cause serious surface damage through subsidence. If groundwater is properly used, however, it is the safest, cheapest, purest water available. In addition to the quantity, purity of groundwater is also endangered. Methods of surface pollution reduction such as underground fuel pipelines, cesspools and septic tanks, buried radioactive wastes, industrial waste pits, injection wells and sanitary landfills all provide dangerous seepage possibilities into groundwater reserves. Since groundwater pollution is difficult detect until too late, action is needed soon to protect groundwater resources for the future. (Comer-Florida)
W76-11895

WISCONSIN STRIVES TO MINIMIZE CONFLICTS OVER THE USE OF WATER,
P. V. McAvoy.
Marquette Law Review, Vol 59, p 145-168 (1976). 24 p, 80 ref.

Descriptors: *History, *Wisconsin, *Water resources, *Groundwater, *Surface water, Judicial decisions, Legal review, Legal aspects, Water resources, Wells, Withdrawal, Water supply, Water table, Water policy, Water allocation(Policy).

Analyzed here is the Wisconsin Supreme Court's record in dealing with groundwater. Two cases are specifically examined, but the broader context covers the development of over 70 years of water law. The court made the shift from the old commonlaw, or English rule, to the more modern American rule, by overruling one of the state's most basic water law cases. The shift was from having complete freedom to draw underground water to withdrawal for a beneficial use. Now it is also possible to sue one who violates this rule at all; previously, no cause of action existed without a showing of malicious intent. This modern view does not indicate a sudden scarcity of water, but rather an acknowledgment that groundwater movement is scientifically predictable. Proof of damage will now be legally acceptable. (Frank-Florida)
W76-11896

DRILLERS STARTED AT THE BOTTOM AND WENT DOWN.
For primary bibliographic entry see Field 8B.
W76-11908

MOST JAMAICAN WATER COMES FROM LIMESTONE AQUIFERS,
National Water Authority of Jamaica (Kingston).
G. Shrivastava.
The Johnson Drillers Journal, Vol. 48, No. 3, p 12-13, May-June, 1976. 1 fig.

Descriptors: *Aquifers, *Limestone, *Karst topography, *Water wells, Permeability, Transmissivity, Model studies, Groundwater.
Identifiers: *Jamaica, Well testing, Well siting, Drilling costs.

Limestone aquifers are the major source of water in Jamaica and their importance is increasing continuously with the demand for water for domestic, agricultural and industrial purposes. The land surface of the island is nearly entirely underlain by limestone and is permiated by karst topography. Ground water levels are ephemeral in the limestone aquifers. An instance of an annual variation of 240 feet has been observed. A well yield of 2000 gallons per minute with minimum drawdown is not unusual. The flow in the hard limestone aquifers is due to a combination of pipe flow, open channel flow and flow through a porous medium. Consequently, equations of groundwater hydraulics have limited application. Aquifer models have provided more reasonable aquifer perameters for local ground-water basins. Well siting has been a problem in the hard limestone aquifers. Well acidizing is used to improve yield in wells where blocking of fissures by fine particles is a problem. Freezing of groundwater around a well shows promise of increasing well yields. Due to the great depth of groundwater occurrence and high drilling cost of drilling, the search for methods to improve well yields continue. (Heiss-NWWA)
W76-11910

ENCRUSTATION,
Plummer and McDannald Co., Galena, Ohio.
For primary bibliographic entry see Field 8G.
W76-11912

USING FRACTURE TRACES TO LOCATE WATER WELLS,
National Water Well Association, Worthington, Ohio.
For primary bibliographic entry see Field 8G.
W76-11916

HARRIS-GALVESTON SUBSIDENCE DISTRICT CREATED TO 'END' SUBSIDENCE,
Harris-Galveston Coastal Subsidence District, Houston, Tex.
E. Wagoner.
The Cross Section, Vol. 22, No. 6, p 3-4, June, 1976. 1 fig.

Descriptors: *Land subsidence, *Groundwater, *Water wells, Legislation, Water supply, Hydraulics, Safe yield, Water conservation, Water demand, Surface waters, Well permits, Texas.
Identifiers: *Galveston Coastal Subsidence District.

Land surface subsidence has become a critical problem in some areas of the Texas Gulf Coast area in recent years. During 1974 an average of 200 million gallons of water per day was pumped from an area including all of Galveston county and the eastern half of Harris County. Because of its low elevation, the land in the area of concentrated emphasis is critically affected by subsidence. The Harris-Galveston Coastal Subsidence District was created in 1975 by the 64th Texas Legislature to combat this problem. The plan is to control subsidence within the boundaries of the districts jurisdiction by reduction of ground water withdrawals to amounts which will restore and maintain sufficient artesian pressure to control and prevent subsidence. The District planners recognize surface waters as a viable alternative for meeting the increasing water needs of Harris and Galveston counties. The three principal sources of surface waters available to the area within the District are the Trinity, San Jacinto and Brazos Rivers. A number of water users are using surface water and others are planning to convert to surface water in the future. Additional need of surface water supplies has prompted the construction of

Lake Livingston on the Trinity River which will yield 840 million gallons per day by the end of 1976. Well permits are required for wells already existing and wells to be drilled. The permits are issued for a term of one to five years. At least once a year the District makes a complete study of the ground-water situation to determine water levels, rates of withdrawal and other information which may affect land subsidence within the district. (Heiss-NWWA)
W76-11919

DISTRIBUTED PARAMETER IDENTIFICATION OF GROUNDWATER SYSTEMS BY NON-LINEAR ESTIMATION,
Universidad de Los Andes, Merida (Venezuela). Dept. of Systems Engineering.
For primary bibliographic entry see Field 2F.
W76-11957

PROBLEMS OF GROUNDWATER RIGHTS IN OHIO,
Akron Univ., Ohio. School of Law.
A. H. Coogan.
Akron Law Review, Vol 9, No 1, p 34-115 (1975). 82 p, 31 fig, 2 append.

Descriptors: *Ohio, *Groundwater, *Judicial decisions, *Riparian rights, Common law, Water pollution control, Water pollution effects, Classification, Water resources, Legal review, Underground, Groundwater resources, Groundwater movement, Underground streams, Water supply, Surface water availability, Trespass, Groundwater availability, Groundwater potential.

This article outlines the development and the status of the law applicable to groundwater problems in Ohio. A summary of the Ohio law and cases dealing with groundwater rights are presented. Trends, exceptions and critical turning points in Ohio groundwater law are noted. Three types of problem cases are recognized: cases involving interference with groundwater supply; cases involving interference with a surface water supply through use of groundwater supply; and cases of damage to property through the use of groundwater. In groundwater interference cases the Ohio Supreme Courth has applied the English, or absolute rule, that groundwater extracted from one's land is part of the freehold and derived from one's ownership of the soil. Even so, some lower courts have limited the taking of groundwater to situations where there is no interference with established riparian rights and no resulting 'draw down' of surface streams. Another groundwater principle not yet applied in Ohio is that of trespass. Groundwater which flows to adjacent lands and detrimentally affects its use and value is a trespass. As water becomes more scarce in Ohio, there will undoubtedly be arguments for the abandonment of the strict application of the absolute rule. (Hadoulias-Florida)
W76-11980

REVIEW OF PROJECTS AFFECTING SOLE SOURCE AQUIFERS, EDWARDS UNDERGROUND RESERVOIR, TEXAS AREA; INTERIM PROJECT REVIEW GUIDELINES.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11991

WATER MANAGEMENT DURING DROUGHT EVENTS,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 4A.
W76-12000

RECYCLE--REUSE, INFALL--OUTFALL, DECISIONS CONFRONT SCIENCE, PUBLIC,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 5D.
W76-12001

MANAGING SOUTH FLORIDA'S GROUNDWATER AQUIFER,
Central and Southern Florida Control District, West Palm Beach.
W. V. Storch.
In Depth Report, Vol 1, No 3, p 1-12, March 1972. 12 p, 5 fig, 1 tab.

Descriptors: *Aquifers, *Surface-groundwater relationships, *Florida, *Groundwater, *Groundwater resources, Water resources, Water table, Water table aquifers, Droughts, Water storage, Groundwater movement, Groundwater potential, Groundwater availability, Subsurface waters, Surface waters, *Water management(Applied).

Maps, tables and charts indicate aquifer withdrawal patterns throughout the state of Florida. This information suggests that, barring extreme drought or increased waste, there will be sufficient resources of water for the forseeable future in Florida. The geologic nature of several different aquifers are discussed, as well as the intimate connection between surface and subsurface waters. The relationship between fresh and saltwater is also explored. The use of electronic analog models, financed by the Federal Government, aid in predicting aquifer reaction to surface weather conditions. (Frank-Florida)
W76-12002

EXAMINATION OF WATER MANAGEMENT ALTERNATIVES IN CONSERVATION AREA 2A.
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 4A.
W76-12003

THE UNTAPPED UNDERGROUND SEA OF PURE WATER,
R. Gannon.
Popular Science, Vol 204, p 92-94, 150-151, April, 1974. 5 p, 1 map, 1 illus, 5 photo.

Descriptors: *Groundwater recharge, *Groundwater resources, *Hydrologic cycle, *Aquifers, *Geological surveys, Groundwater, Freshwater, Hardness(Water), Water supply, Water table, Water pollution, Land subsidence, Saline water intrusion, Surface waters, Water demand, Water wells, Stream-groundwater relationships, Natural recharge, Streamflow, Groundwater mining, Groundwater availability, Surface water availability, Water utilization.

Improved techniques for locating, measuring and keeping track of water are being utilized by the United States Geological Survey. Although surface water supplies are running low, surface water is only 4% of the potential freshwater supply. Presently, 20% of the nation's water needs is filled from underground reservoirs. Unfortunately, groundwater is usually hard water because of dissolved minerals. It may also be contaminated. The three methods used successfully to purify polluted groundwater supplies are containment, reduction of leachate concentration and retrieval wells. Another problem pertaining to groundwater occurs when the water table is lowered in areas where the groundwater recharge rate is lower than the water removal rate. This lowering of the water table can cause reduced streamflow since half the water flowing in streams comes from groundwater rather than surface runoff. Some regions also experience problems of land subsidence when the water table is lowered while coastal areas often suffer from salt water intrusion. (Capehart-Florida)
W76-12022

GROUND WATERS.
For primary bibliographic entry see Field 6E.
W76-12062

4C. Effects On Water Of Man's Non-Water Activities

APPRAISAL OF THE WATER RESOURCES OF CHARLOTTE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
H. Sutcliffe, Jr.
Florida Bureau of Geology, Tallahassee, Report of Investigations No 78, 1975. 53 p, 18 fig, 13 tab, 24 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water quality, *Water demand, *Urbanization, Hydrologic data, Water levels, Water yield, Water utilization, Chemical analysis, Surface-groundwater relationships, Saline water intrusion.
Identifiers: Charlotte County(Fla).

The coastal area of Charlotte County, in west-central Florida, is undergoing rapid urbanization and is experiencing major problems in obtaining sufficient water of suitable quality to meet public-supply requirements. The upper artesian aquifer, or Zone 1, lies 50 to 150 ft below land surface. This zone is commonly used as a source for domestic and small irrigation supplies and provides some water for public supplies. Zone 2 lies 150 to 250 ft below land surface and is used extensively by irrigators in eastern Charlotte County. Zone 3 lies 250 to 400 ft below land surface. Many unused irrigation wells tapping this zone are being plugged by land developers to prevent the movement of saline water (5000 mg/liter of dissolved solids) into the upper zones. Zone 4 lies 600 to 800 ft below land surface and water from this zone is more saline than water from the upper zones. In the western half of the county, the shallow aquifer has been intruded by salt water from the Gulf and the estuaries and from deeper zones. Large water supplies for Charlotte County will be obtained in the future chiefly from: (1) the water-table aquifer in the southeastern part where permeable shell beds yield as much as 600 gpm of potable water; (2) Zones 1 and 2 where they have not been contaminated by saline water; (3) desalted ground water; and (4) water imported from outside the county. (Woodard-USGS)
W76-11676

EARLY DETECTION AND CORRECTION OF SINKHOLE PROBLEMS IN ALABAMA, WITH A PRELIMINARY EVALUATION OF REMOTE SENSING APPLICATIONS,
Geological Survey, Tuscaloosa, Ala.
For primary bibliographic entry see Field 7B.
W76-11688

A HYPOTHESIS FOR URBAN RAINFALL ANOMALIES,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W76-11744

WATER DRAINAGE FROM HIGHWAY FILLS,
Kansas State Highway Commission, Topeka. Planning and Development Dept.
For primary bibliographic entry see Field 8D.
W76-11762

EVALUATION OF STREAM CHANNELIZATION AND MITIGATION ON THE FISHERY RESOURCES OF THE ST. REGIS RIVER, MONTANA,
Montana Cooperative Fishery Unit, Bozeman.
J. A. Lund.
Fish and Wildlife Service, Washington, D. C., Office of Biological Services, Report FWS/OBS-76-07, June 1976. 49 p, 12 tab, 14 ref, append. FWS 14-16-0008-737.

Descriptors: Streambeds, Channel morphology, *Fish populations, *Road construction, *Railroads, Trout, *Montana, Rivers, Turbidity, Erosion, Water temperature, Water chemistry, Streams.
Identifiers: *Stream channelization, Stream morphology, Mitigating devices(Fish), *St Regis River(Mont).

Stream morphology and gamefish populations of the St. Regis River, Montana were studied during the summers of 1973, 1974 and 1975 to determine the effects of stream channelization caused by highway (Interstate 90 and U. S. 10) and railroad construction. In-stream structures used to mitigate fish losses were also evaluated. Population estimates were made using electrofishing methods on unaltered, altered, altered with mitigating structures, and 'old' altered study sections. Physical parameters of each section were mapped to show differences between altered and unaltered sections. Results show that mitigating structures (jetties and random rock clusters) were effective in providing fish habitat comparable to unaltered sections. Fish populations in new channels usually stabilized in approximately one year. Trout populations in 'old' altered sections with no mitigation failed to recover to unaltered section levels. Due to aesthetic reasons, fishermen preferred unaltered or partially altered sections over altered sections. The number of pools per section as measured by pool-riffle periodicity provided the closest correlation to trout population changes. (FWS)
W76-11800

FIELD EVALUATION OF A RECHARGE BASIN,
New York State Dept. of Transportation, Albany. Engineering Research and Development Bureau.
For primary bibliographic entry see Field 4B.
W76-11872

HYDROMETEOROLOGY OF HEAVY RAINSTORMS IN CHICAGO AND NORTHEASTERN ILLINOIS, PHASE I - HISTORICAL STUDIES,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W76-11875

ATMOSPHERIC SULFUR: ITS EFFECT ON THE CHEMICAL WEATHERING OF NEW ENGLAND,
Dartmouth Coll., Hanover, N.H. Dept. of Earth Sciences.
For primary bibliographic entry see Field 5A.
W76-11890

EFFECTS OF FIRE ON NUTRIENT MOVEMENT IN A SOUTH CAROLINA PINE FOREST,
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 5B.
W76-11933

4D. Watershed Protection

EXPERIENCE WITH LAND APPLICATION OF WASTEWATER AND STATE REGULATIONS - THE PENNYPACK WATERSHED,
Martin (A. W.) Associates, Inc., King of Prussia, Pa.
For primary bibliographic entry see Field 5D.
W76-11642

EXPERIENCE WITH LAND APPLICATION OF WASTEWATER AND STATE REGULATIONS - PENNYPACK WATERSHED-PENNSYLVANIA,
Pennypack Watershed Association, Bryn Athyn, Pa.
For primary bibliographic entry see Field 5D.
W76-11643

FLOW FROM SMALL WATERSHEDS ADJACENT TO THE STUDY REACH OF THE GILA RIVER PHREATOPHYTE PROJECT, ARIZONA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2E.
W76-11677

TRAVEL TIMES AND NONLINEARITY OF FLOOD RUNOFF FROM TRACER MEASUREMENT ON A SMALL WATERSHED,
New South Wales Univ., Kensington (Australia), School of Civil Engineering.
For primary bibliographic entry see Field 2E.
W76-11850

SAFETY FACTORS FOR RIPRAP PROTECTION,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W76-11856

A COMPARISON OF PHOSPHORUS AND WATER CONTRIBUTIONS BY SNOWFALL AND RAIN IN NORTHEAST OHIO,
Kent State Univ., Ohio. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W76-11858

DEVELOPMENT OF THE UNIVERSITY OF HAWAII-MANOA STREAM GAGING STATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 4A.
W76-11876

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

EVALUATION OF PFIZER SELECTIVE ENTEROCOCCUS AND KF MEDIA FOR RECOVERY OF FECAL STREPTOCOCCI FROM WATER BY MEMBRANE FILTRATION,
Ontario Ministry of Health, Toronto(Ontario). Lab. Services Branch.
M. H. Brodsky, and D. A. Schiemann.
Applied and Environmental Microbiology, Vol. 31, No. 5, p 695-699, May, 1976. 3 tab, 16 ref.

Descriptors: *Streptococcus, *Sewage effluents, *Membrane processes, *Analytical techniques, Filters, Microbiology, Bacteria, Microorganisms, Hydrolysis, Evaluation, Performance, Efficiencies, *Pollutant identification.
Identifiers: Enterococci, Membrane filtration.

Pfizer selective enterococcus and KF agars were compared for their recovery of fecal streptococci from sewage effluent on membrane filters. The KF agar recovered significantly greater numbers of organisms but was not as selective as the Pfizer agar. About 83% of the typical colonies were confirmed as fecal streptococci and 54% as enterococci with the KF agar, and more than 90% of all colonies recovered on membrane filters were confirmed as fecal streptococci and 86% as enterococci with the Pfizer agar. The tan color resulting from esculin hydrolysis, which was not always visible on the surfaces of the colonies, was not considered a necessary differential characteristic on the Pfizer agar. The detection of esculin hydrolysis on membrane filters was not improved by using a new Millipore type HC filter. An attempt to improve the selectivity of KF agar while retaining its inclusiveness by incubation at 45 C was not successful. (Kreager-FIRL)
W76-11628

MICROMETHODS FOR THE DETERMINATION OF NONFILTERABLE AND FILTERABLE RESIDUES,
Environmental Protection Agency, Chicago, Ill. Central Regional Lab.
M. J. Carter, M. Huston, and O. J. Logsdon II.
Journal Water Pollution Control Federation, Vol. 48, No. 4, p 652-659, April, 1976. 5 tab, 23 ref.

Descriptors: *Gravimetric analysis, *Pollutant identification, *Analytical techniques, Evaluation, Filters, Equipment, Measurement, Filtration, Membrane processes.
Identifiers: Filterable residues.

Micromethods for the gravimetric analysis of nonfilterable and filterable residues in water samples are described and compared with standard methods. An electronic microbalance equipped with digital display units and a polonium-210 ionizing source to reduce the electrostatic charge on the filters is used for both nonfilterable and filterable determinations. Sample filtration is performed with a Millipore thirty-place membrane sampling manifold using 15- by 125 millimeter culture tubes to receive the filtrate. A comparison of the micromethod for both nonfilterable and filterable residue analysis with the corresponding standard methods reveals no significant differences for a variety of water sample types. The precision of the micromethod for nonfilterable residue analysis is 3 mg/liter below 50-mg/liter nonfilterable residue and 9 mg/liter above 50 mg/liter at the 95% confidence level. The precision of the method for filterable residue analysis is 26 mg/liter at the 95% confidence level. (Kreager-FIRL)
W76-11633

THE USE OF CARBON DIOXIDE IN SAMPLING AND PRESERVING NATURAL LEACHATES,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
N. E. Korte, E. E. Niebla, and W. H. Fuller.
Journal Water Pollution Control Federation, Vol. 48, No. 5, p 959-961, May, 1976. 2 fig, 2 tab, 9 ref.

Descriptors: *Leachate, *Sampling, *Preservation, *Carbon dioxide, *Chemical properties, Landfills, *Pollutant identification, Inorganic compounds, Ions, Chemical reactions.

The use of carbon dioxide for preserving natural leachate samples collected for the purpose of assessing the pollution potential of sanitary landfills was investigated. Two sets of natural leachate obtained from a commercial septic tank were collected, one under carbon dioxide and the other exposed to the atmosphere. For the collection and maintanance of samples under carbon dioxide, the collection vessel was first purged with the gas, and the leachate was added while the effluent was being flushed with carbon dioxide. Leachate collected with carbon dioxide did not show precipitation or changes in pH, color, and dissolved inorganic ion concentration which were associated with leachate samples exposed to the atmosphere. Such changes occurred even as a result of momentary contact of the sample with air, indicating the degree of precaution required to preserve neutral leachates. (Kreager-FIRL)
W76-11634

MOST PROBABLE NUMBER VERSUS MEMBRANE FILTER ON CHLORINATED EFFLUENTS,
Rockland County Sewage Treatment Plant, Orangeburg, N. Y.
For primary bibliographic entry see Field 5D.
W76-11635

DETERMINATION OF NITRATE ION AT THE PART PER BILLION LEVEL IN ENVIRONMENTAL SAMPLES WITH A CONTINUOUS FLOW IMMOBILIZED ENZYME REACTION,
Georgia Univ., Athens. Dept. of Chemistry.
D. R. Senn, P. W. Carr, and L. N. Klatt.
Analytical Chemistry, Vol. 48, No. 7, p 954-958, June, 1976. 4 fig, 4 tab, 29 ref.

Descriptors: *Colorimetry, *Enzymes, *Nitrates, *Pollutant identification, Analytical techniques, Industrial wastes, Sea water, Effluents, Ions.

An enzymatic procedure for the colorimetric determination of nitrate ion in aqueous samples is described. The mehod is based on the enzymatic reduction of nitrate to nitrite by the radical nitrite by the radical cation of 1,1'-dimethyl-4,4'-bipyridinium dichloride in the presence of the enzyme nitrate reductase. The production of nitrite is monitored by the sulfanilamide N-(1-naphthyl) ethylenediamine dichloride azo dye reaction. A detection limit of 17 ppb is possible using a 1-centimeter cell in a continuous flow analyzer. The detection limit can be increased to about 2 ppb by using a non-flow system since photometer noise is the major limiting factor. Although the procedure utilizes an immobilized enzyme, the method can be adapted for use with soluble enzyme preparations. Analyses of industrial effluent samples revealed good correlation with the accepted copper-cadmium reductor method. The precision of the method is 1% in a continuous flow analyzer for a concentration of 0.2 ppm. The method can also be used for analyzing sea water samples where the nitrate content is typically less than 50 ppb. (Kreager-FIRL)
W76-11636

CONTRIBUTION TO THE STUDY OF STORM WATER IN URBAN ENVIRONMENT (CONTRIBUTION A L'ETUDE DES EAUX DE RUISSELLEMENT EN MILIEU URBAIN),
J. Poustis, G. Martin, and J. P. Dubreuil.
Techniques et Sciences Municipales--L'Eau, Vol. 71, No. 4, p 179-181, April, 1976. 3 fig, 1 tab, 2 ref.

Descriptors: *Pollutant identification, *Storm water, *Cities, *Drainage water, *Urban drainage, *Recreation, Zinc, Copper, Chemical oxygen demand, Lead, Organic compounds, *Storm water, Urban runoff.

A study was made in an urban environment to assess the potential hazards of using drainage water for recreational purposes. Zinc and copper contents were low, but significant quantities of lead and hydrocarbons were found. Chemical oxygen demand (COD) is at a maximum after one hour of rain, and greater after a long dry spell, but pollution due to storm water remains small. (Snyder-FIRL)
W76-11637

AN EVALUATION OF THE APPLICABILITY OF PYROLYSIS-GAS-LIQUID CHROMATOGRAPHY FOR THE IDENTIFICATION OF MICROORGANISMS IN WATER AND SEWAGE TREATMENT PLANT EFFLUENTS,
National Bureau of Standards, Washington, D. C. Center for Building Technology.
R. A. Symuleski.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 457-461. 2 fig, 1 tab, 29 ref.

Descriptors: *Pollutant identification, *Bacteria, *Waste water treatment, *E. coli, *Chromatography, *Automation, Effluents, Analytical techniques, Coliforms, Microorganisms, Feasibility studies, Evaluation.
Identifiers: *Pyrolysis-gas-liquid chromatography.

A study of pyrolysis-gas-liquid chromatography was performed to determine its feasibility for the automated identification of bacteria in water and waste water treatment effluents. Analysis of chromatograms and integrator tapes from ten runs on Escherichia coli showed a vary high degree of reproducibility, even between samples with weight differences of between 300 and 400 micrograms. The maximum standard deviation in retention time for any one peak occurring early in the trace was plus or minus 0.07 minutes. The highest degree of reproducibility in retention times occurred after peak 16, with the maximum standard deviation being plus or minus 0.04 minutes. The technique appears to have good potential for routine taxonomic work, and the present study indicates that the detection of E. coli can be made at levels that are occasionally encountered in sewage treatment plant effluents. Further work is necessary to determine whether or not the technique is applicable for the analysis of bacteria at concentrations as low as 2-10 colonies/100 ml. (See also W76-11257) (Kreager-FIRL)
W76-11664

EVALUATION OF TOXICITIES AND ENVIRONMENTAL IMPACT IN 'SYMBIOTIC' WATER REUSE SYSTEMS,
For primary bibliographic entry see Field 5D.
W76-11665

A PRELIMINARY EVALUATION OF THE CHEMICAL CHARACTER OF WATER NEAR THE NORTHWEST SHORE OF TOPAZ LAKE, DOUGLAS COUNTY, NEVADA,
Geological Survey, Carson City, Nev.
J. O. Nowlin.
Open-file report 76-419, 1976. 14 p, 5 fig, 1 tab, 3 ref.

Descriptors: *Baseline studies, *Water quality, *Groundwater, *Land development, Septic tanks, Sewage effluents, Data collections, Water analysis, Chemical analysis.
Identifiers: *Topaz Lake area(Nev).

The potential for intensive development of land near Topaz Lake, Douglas County, Nevada, has raised concern regarding the possible effect of septic-tank effluents on the quality of local ground waters and the lake. Analyses of samples from 13 wells, one spring, the lake, and an inflowing creek were examined for trends in chemical composition. Sampled ground waters from sites upgradient in the hydrologic system have higher concentrations of sulfate and dissolved solids than ground waters near the creek and the lake. Preliminary data suggest that the ground-water reservoir in downgradient areas is locally recharged by the creek and perhaps by the lake. (Woodard-USGS)
W76-11674

APPRAISAL OF THE WATER RESOURCES OF CHARLOTTE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4C.
W76-11676

GROUND-WATER QUALITY AT THE SITE OF A PROPOSED DEEP-WELL INJECTION SYSTEM FOR TREATED WASTEWATER, WEST PALM BEACH, FLORIDA,
Geological Survey, Tallahassee, Fla.
W. A. J. Pitt, Jr., and F. W. Meyer.
Open-file report 76-91, 1976. 43 p, 8 fig, 8 tab, 8 ref.

Descriptors: *Water quality, *Groundwater, *Baseline studies, *Waste disposal wells, *Test wells, Forecasting, Path of pollutants, Sewage treatment, Sewage effluents, Injection wells, Deep wells, Evaluation, Aquifers.
Identifiers: *West Palm Beach(Fla), Pre-well construction data.

The U. S. Geological Survey collected scientific and technical information before, during, and after construction of a deep test well at the location of a future regional waste-water treatment plant to be built for the city of West Palm Beach, Florida. Data from the test well will be used in the design of proposed deep-well injection system for disposal of effluent from the treatment plant. Shallow wells in the vicinity of the drilling site were inventoried and sampled to provide a data base for detecting changes in ground-water quality during construction and later operation of the deep wells. In addition, 16 small-diameter monitor wells, ranging in depth from 10 to 162 feet, were drilled at the test site. During the drilling of the deep test well, water samples were collected weekly from the 16 monitor wells for determination of chloride content and specific conductance. Evidence of small spills of salt water were found in wells raging in depth from 10 to 40 feet. (Woodard-USGS)
W76-11681

HYDROLOGIC RECONNAISSANCE OF THE PINE VALLEY DRAINAGE BASIN, MILLARD, BEAVER, AND IRON COUNTIES, UTAH,
Geologicsl Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 4B.
W76-11683

DDT PLUS PCB'S IN BLUBBER OF HARBOR SEALS,
National Marine Fisheries Service, Seattle, Wash. Northwest Fisheries Center.
R. E. Anas.
Pestic Monit J. 8(1), p 12-14, 1974.

Descriptors: *DDT, *Polychlorinated biphenyls, *Chlorinated hydrocarbon pesticides, California, Oregon, Washington, Alaska, Columbia River, Islands, Sounds, Sampling, *Pollutant identification.
Identifiers: Phoca-Vitulina-Richardi, *Harbor seals, Seal blubber, Puget Sound(Wash), San Miguel Islands(Calif), Priblof Islaands(Alas).

Samples of blubber from 13 harbor seals (Phoca vitulina richardii) were collected in 1971 from San Miguel Island, Calif. (USA); the Columbia River, Oreg.; Puget Soud, Wash.; and the Pribilof Islands, Alaska. Total amounts of DDT plus PCB's (polychlorinated biphenyls) ranged from 380.7-2350.0 ppm in San Miguel Island seals; 459.4-1620.0 ppm in 2 Puget Sound seals; 27.7-109.9 ppm in 3 Columbia River seals; and 6.8-27.8 pmin 3 Pribilof Island seals. There was no indication of loss of total DDT plus PCBs in 3 samples reanalyzed after 2 yr in frozen storage.--Copyright 1975, Biological Abstracts, Inc.
W76-11698

COMPUTATION OF LETHAL CONCENTRATIONS,
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
G. Stora.
Marine Pollution Bulletin, Vol. 5, No. 5, 1974, p. 69-71, 3 tab, 1 fig.

Descriptors: *Bioassay, Methodology, *Toxicity, *Mortality, *Statistical methods, Analytical techniques, Detergents, *Lethal limit, Annelids, Laboratory methods, Benthos, *Toxins.
Identifiers: Polychaetes, LC50, Population homogeneity.

As they are normally determined, lethal concentrations of toxins to particular organisms are given

within very wide limits. It is possible, however, to test the homogeneity of the population being sampled and derive an accurate value for the lethal concentration, together with confidence limits of that value. (Katz)
W76-11711

THE CONCENTRATIONS OF MERCURY, CADMIUM, LEAD AND COPPER IN FISH AND SHELLFISH OF KOREA, (IN KOREAN),
Pusan Fisheries Coll. (Republic of Korea).
J. H. Won.
Bull Korean Fish Soc. 6(1/2), p 1-19, 1973.

Descriptors: *Mercury, *Cadmium, *Lead, *Copper, *Fish, *Shellfish, Asia, Oysters, Crustaceans, *Heavy metals, Pollutant identification, Water pollution effects.
Identifiers: Exoskeleton, *Korea, Octopus, Squid.

Heavy metal concentrations were detected in fish and shellfish sampled from Oct. 1971-April 1972, in Korea. In general, fish viscera, shellfish muscle and crustacean exoskeletons contained high concentrations of the metals. Samples from the W coast contained relatively high concentrations of Hg, Cu, Cd and Pb, but those of the S coast contained high levels of Cd and Pb. The concentrations of Cu in the samples of the W coast were almost twice as much those of the other coasts. Hg concentrations in the samples raged from 0.02-0.58 ppm with an average of 0.16 ppm. Cd concentrations were higher in fish viscera and shellfish than in fish muscle, ranging from less than 0.02-0.78 ppm with an average of 0.12 ppm in the muscle samples. Pb concentrations were slightly higher in the fish viscera. In muscle and bone the range was 0.06-4.84 ppm with an average of about 1 ppm. Cu concentration was very high in the viscera. Shellfish muscle contained almost 4 times as much Cu as fish muscle, particularly cephalopods, i. e., squid and octopus, contained very high levels of Cu, and oysters collected from Gunsan area on the west coast contained the highest levels of Cu. Cu concentrations ranged from 0.12-28.7 ppm with an average of 1.4 ppm in fish muscle and 5.9 ppm in shellfish muscle.--Copyright 1975, Biological Abstracts, Inc.
W76-11729

DETERMINATION OF M-PHENYLENEDIAMINE IN WATER, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
N. F. Kazarinova, I. S. Dukhovnaya, and L. E. Myannik.
Gig Sanit. 11, p 61-63, 1974.

Descriptors: *Pollutant identification, Water analysis, Analytical techniques, Organic compounds, *Chromatography, *Methodology.
Identifiers: *Epoxy, *Phenylenediamine, Thin layer chromatography.

A method was developed for determining the toxic substance m-phenylenediamine in water based on extraction of the preparation from water with subsequent quantitative determination with TLC. Migration of m-phenylenediamine from epoxy coatings into water simulating food products depended on the relationship of the ingredients in the coating formula, time of exposure and temperature of the model medium.--Copyright 1975, Biological Abstracts, Inc.
W76-11730

USE OF ANIMAL BEHAVIOR STUDIES IN WATER TOXICOLOGY, (IN RUSSIAN),
Akademiya Nauk SSSR, Tolyatti. Institut Biologii Vnutrennykh Vod.
B. A. Flerov.
Gidrobiol Zh. 10(5), p 114-120, 1974.

Descriptors: *Toxicity, Reviews, *Fish behavior, Invertebrates, *Bioindicators, Metabolism, *Pollutant identification, Testing, *Animal behavior.
Identifiers: Literature reviews.

A literature review on the use of investigations of the behavior of fish and invertebrates in water pollution toxicology is presented. The behavior reactions can serve as indices of the effect of sublethal concentrations of toxic substances. Changes in behavior are the initial signs of metabolic disorders and therefore can be used as operative, sensitive tests for toxicity of the pollutants in the water.--Copyright 1975, Biological Abstracts, Inc.
W76-11731

INTERACTION OF BLUE-GREEN ALGAE WITH MULTIPLY-CHARGED INORGANIC CATIONS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. of Colloidal Chemistry and Water.
V.I. Zhuravleva, L. A. Kul'skii, and E. S. Matskevich.
Gidrobiol Zh. 10(6), p 82-84, 1974.

Descriptors: *Cyanophyta, *Cations, *Kinetics, Biomass, Salts, *Separation techniques, Flotation, *Algae, *Pollutant identification.
Identifiers: Microcystis-Aeruginosa, *Aggregation.

The kinetics of separation of an algal biomass in the presence of salts formed by multiply charged cations (La, Tl, Al, Fe) with application of a direct electric current to the culture of blue-green algae (Microcystis aeruginosa) was studied. The effectiveness of separating the algal mass from the water increases with decreasing pH. The processes of aggregation and flotation (i.e., formation of neuston film) are due to interaction of the cells with the multiply charged cations and not with their hydrolysis products. These phenomena were not observed on applying a direct current to the algae without the addition of the salts of multiply charged cations and an increase of the application time of the current promoted a more energetic aggregation and flotation.--Copyright 1975, Biological Abstracts, Inc.
W76-11736

A HYPOTHESIS FOR URBAN RAINFALL ANOMALIES,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W76-11744

PRACTICAL APPLICATIONS OF SPACE SYSTEMS, SUPPORTING PAPER 5, INLAND WATER RESOURCES.
National Research Council, Washington, D. C. Panel on Inland Water Resources.
For primary bibliographic entry see Field 4A.
W76-11758

USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER RESOURCES PLANNING AND MANAGEMENT IN NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. of Geosciences.
C. W. Welby.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-257 098, $6.00 in paper copy, $3.00 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Report No. 115, June 1976. 110 p, 32 fig, 7 tab, 14 ref. OWRT A-076-NC, 14-31-0001-4033.

Descriptors: *Aerial photography, *Photogammetry, *Monitoring, *Pollutant identification, Water management(Applied), Photography, Water quality, Planning, *North Carolina, Biomass, Secchi disc, Measurement.
Identifiers: *Multispectral photography, Chowan River(NC).

A series of multispectral aerial photographic missions were flown over the Chowan River of North Carolina to study and evaluate possible uses of multispectral photography in planning for and management of North Carolina's water resources. Flights were also made over parts of the Cape Fear River and Northeast Cape Fear. The report describes how the technique might be used to trace pollutants associated with turbid water and how water draining from the swamps might be traced in larger water bodies. The technique has potential usefulness for monitoring phytoplankton buildups and can be used even if only limited groundtruth is available. Areas of apparently differing water quality were monitored by the multispectral photography both in the Chowan River and in the Northeast Cape Fear River. A technique was developed by which the difference between the extinction depths of a red quadrant and a white quadrant on a modified Secchi disc can be used with water sampling and analysis to obtain biomass concentrations indirectly. This relationship can be one of the groundtruth measurements used to establish relationships between the reflectance characteristics of a water body and various water quality parameters direcly or indirectly. (Stewart-North Carolins State)
W76-11773

EFFECTS OF SUB-NORMAL TEMPERATURES ON SOME COMMON LOS ANGELES HARBOR ANIMALS,
University of Southern California, Los Angeles. Allan Hancock Foundation.
For primary bibliographic entry see Field 5C.
W76-11796

PRELIMINARY INVESTIGATIONS OF THE EFFECTS OF RESUSPENDED SEDIMENT ON TWO SPECIES OF BENTHIC POLYCHAETES FROM LOS ANGELES, HARBOR,
University of Southern California, Los Angeles. Allan Hancock Foundation.
For primary bibliographic entry see Field 5C.
W76-11799

SAND FLATHEAD (PLATYCEPHALUS BASSENSIS) AN INDICATOR SPECIES FOR MERCURY POLLUTION IN TASMANIAN WATERS,
Tasmanian Dept. of Agriculture, Hobart (Australia). Sea Fisheries Div.
For primary bibliographic entry see Field 5B.
W76-11820

REGIONAL CHARACTERISTICS OF THE TOTAL DISSOLVED MINERALS IN STREAM WATERS IN ILLINOIS,
Northern Illinois Univ., DeKalb. Dept. of Geology.
R. C. Flemal, and M. M. Nienkerk.
Water Resources Bulletin, Vol. 12, No. 3, p 501-509, June 1976. 2 fig, 4 tab, 10 ref. S-046-ILL.

Descriptors: *Water chemistry, *Chemical analysis, *Illinois, *Dissolved solids, *Natural streams, *Mineralogy, Analytical techniques, Water analysis, Water quality, Water properties, Streams, Rivers, Surface waters, Urban runoff, Sulfates, Carbonates, Geology, Water pollution sources, Regions.
Identifiers: *Dissolved minerals, *Illinois River(Ill), *Fox River(Ill), *Vermilion River(Ill), Environmental quality, Regional characteristics.

Using water analyses from 67 gaging stations, discharge-frequency-weighted mean concentrations and average annual yield per unit area were determined for the total dissolved mineral content of Illinois streams. The resultant data indicated that total dissolved mineral contents are controlled by regional rather than local factors. In most cases plausible explanation for the magnitudes could be found in regional patterns of natural and demographic conditions. Although the data suggested

that total dissolved minerals are increasing, the relative contributions of natural versus anthropogenic phenomena were difficult to delimit at this level of investigation. (Henley - ISWS)
W76-11857

ATMOSPHERIC SULFUR: ITS EFFECT ON THE CHEMICAL WEATHERING OF NEW ENGLAND,
Dartmouth Coll., Hanover, N.H. Dept. of Earth Sciences.
N. M. Johnson, and R. C. Reynolds.
Science, Vol 177, p 514-16, 1972. 3 p, 1 fig, 1 tab.

Descriptors: *Hydrogen sulphide, *Chemical degradation, *Cations, *Bicarbonates, *Weathering, Aging(Physical), Geomorphology, Ion exchange, Anions, *New England, *New Hampshire, Air pollution, Path of pollutants, Fossil fuels, Water pollution sources, Water pollution effects.
Identifiers: Hubbard Brook Experimental Forest(NH).

Excessive deposits of atmospheric sulphur originating from fossil fuel burning has long characterized the Northeast, especially New England. This study records the extent and consequences of atmospheric pollution around the Hubbard Brook Experimental Forest in New Hampshire. The rainwater of New England contains 3 to 4 milligrams per liter (mg/liter) of sulfate, whereas normal precipitation on a worldwide basis, saturated with carbon dioxide, is much less acidic. As a result, New England rainwater pH is about 4.1, compared to normal 5.7, and the dominant anion in the Hubbard Brook streams is sulfate rather than the normally dominant anion bicarbonate. The higher acidity of the Hubbard Brook water would tend to indicate that chemical weathering rates of rocks would be higher than normal. The studies indicate, however, that weathering reactions in the area are relatively incomplete, possibly because of the maturity of the area soil. The studies also show that cationic denudation in the Hubbard Brook area is considerably lower than normal, thus indicating that carbonation reactions are responsible for denudation. New studies are required to more fully evaluate the results. (Comer-Florida)
W76-11890

DEVELOPMENT OF BUOY MOUNTED HYDROCARBON VAPOR SENSORS FOR USE IN LOCAL AREA POLLUTION SURVEILLANCE SYSTEMS,
Midwest Research Inst., Kansas City, Mo.
L. H. Goodson, W. B. Jacobs, and S. K. Puent.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-A022 855, $4.50 in paper copy, $3.00 in microfiche. U.S. Coast Guard Report No. USCG-D-10-76, July 1975. 110 p, 33 fig, 2 tab, 3 ref, 2 append. DOT-CG-034320-A.

Descriptors: *Continental Shelf, *Monitoring, *Oil spills, *Oil pollution, *Water pollution, *Resources development, Buoys, Lakes, Oceans, Environment, Pollution abatement, *Pollutant identification.
Identifiers: *Outer Continental Shelf, Hydrocarbons, Vapor sensors, Surveillance, Marine environment.

The feasibility of using hydrocarbon vapor sensors on buoys along watercourses for the signalling of oil spills on a real time basis has been investigated. As a result of laboratory testing of five types of vapor sensors, it was concluded that the Taguchi Semiconductor Gas Sensor (TGS) was promising for this application. Two other vapor sensors selected by the U. S. Coast Guard for further investigation were the Esso oil on water piezoelectric sensor and the Environmental Measurement Systems' Adhistor sensor (WSM-350). These three sensors were evaluated in the laboratory, in the rooftop environment, and in a lake environment. The TGS sensor and the Adhistor sensor were also investigated in the marine environment. Recommendations for further testing and evaluation of the TGS sensor on buoys are made. (Sinha-OEIS)
W76-11930

OIL-IN-WATER CONTENT MONITOR DEVELOPMENTAL PROGRAM SUMMARY,
Coast Guard, Washington, D.C. Office of Research and Development.
R. W. Montfort.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A-022 960, $4.00 in paper copy, $3.00 in microfiche. Interim Report No. USCG-D-188-75, December 1975. 39 p, 18 fig, 1 tab, 3 ref.

Descriptors: *Continental Shelf, *Water quality control, *Oil pollution, *Monitoring, *Environmental effects, *Water pollution, *Instrumentation, Oily water, Water pollution sources, Fluorescence.
Identifiers: *Outer Continental Shelf, Bilge water, Light scattering.

Feasibility of three concepts for oil-in-water content monitors developed under separate Coast Guard contracts is described. The three methods - oil fluorescence synchronous scanning, light scattering at ninety degrees ratioed against light transmission, and small angle forward light scattering ratioed against light transmission - allow the breadboard monitors to measure oil linearly over the range of 0 to 100 ppm when oil type is known. Also, a second phase feasibility study is described. The work includes: modifying the monitors to improve their sensitivity and selectivity to oil, thus reducing the envelope of curves due to different linear responses to different oil types, and reducing background bias due to particulates or varying water conditions; resolving areas of uncertainty that came to light during the first phase; and demonstrating the instruments' capabilities and limitations in monitoring the effluent from an oily water separator. (Sinha-OEIS)
W76-11941

TRACE METALS IN OYSTERS FROM KNYSNA ESTUARY,
National Physical Research Lab., Pretoria (South Africa).
For primary bibliographic entry see Field 2L.
W76-11966

INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11992

AMOUNTS AND SPECTRAL PROPERTIES OF DISSOLVED ORGANIC COMPOUNDS FROM SOME FRESHWATER OF THE SOUTHEASTERN U.S.,
Savannah River Ecology Lab., Aiken, S. C.
W. M. Lewis, Jr., and J. A. Tyburczy.
Arch Hydrobiol. 74(1), p 8-17, 1974. (In Engl. with Engl. and Ger. summ.).

Descriptors: *Southeast U.S., *Organic compounds, Freshwater, Dissolved solids, *Gas chromatography, *South Carolina, Coastal plains, *Pollutant identification, Lakes, Rivers, Streams.

Collections of stream, river, and lake water taken from the coastal plain area of South Carolina were analyzed for dissolved organic C using gas chromatography. Complete absorbance spectra between 200-950 mn were also obtained on many of the samples so that statistical tests could be made of the intensity and form of the absorbance-organic carbon relationship at various wavelengths. Dissolved organic C levels averaged about 7 ppm in the predominately dark-water areas covered by the survey and ranged between 3-16 ppm. Correlations between organic C and absorbance reached a maximum of about 0.92 between 300-360 nm. The upper end of this range, specifically 360 nm, offers maximum sensitivity consistent with minimum relative variance as determined by the analysis of regression slopes at all wavelengths. Change in the intercept of the dissolved C-absorbance relation at various wavelengths is apparently related to the presence of 3 or more groups of compounds with differing optical properties. The data are used to derive an equation that accurately predicts dissolved organic C from absorbance at any wavelength between 260-360 nm. The precision of this prediction and its possible general applicability are discussed.--Copyright 1975, Biological Abstracts, Inc.
W76-12138

TRANSFORMATIONS OF METHYLAMINES AND FORMATION OF A HAZARDOUS PRODUCT: DIMETHYLNITROSAMINE, IN SAMPLES OF TREATED SEWAGE AND LAKE WATER,
International Inst. of Tropical Agriculture, Ibadan (Nigeria).
For primary bibliographic entry see Field 5B.
W76-12141

ADSORPTION OF PICLORAM (4-AMINO-3,5,6-TRICHLOROPICOLINIC ACID) ON PANOCHE, EPHRATA, AND PALOUSE SOILS: A THERMODYNAMIC APPROACH TO THE ADSORPTION MECHANISM,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 5B.
W76-12142

AN EVALUATION OF THE MILLER METHOD FOR DISSOLVED OXYGEN ANALYSIS,
Wollongong Univ. Coll. (Australia). Div. of Biology and Chemical Sciences.
J. Ellis, and S. Kanamori.
Limnol Oceanogr. 18(6), p 1002-1005, 1973.

Descriptors: *Dissolved oxygen, *Methodology, Oxygen, Salinity, *Volumetric analysis, *Analytical techniques, Pollutant identification.
Identifiers: Dissolved, Method, Miller, Oxygen, pH, Standardization, Winkler Miller method(Analysis), Winkler method(Analysis).

The Miller and Winkler methods for dissolved O2 determination are compared over a range of salinities and O2 levels. By performing the Miller titration using a capillary sidearm flask, atmospheric O2 may be excluded and a precision of +O.O5 mg O2 liter-1 obtained. The Miller end point is highly dependent on pH and on the ratio of NaOH to sodium potassium tartrate, so that carefully standardized conditions must be used to obtain accurate and reproducible results.--Copyright 1974, Biological Abstracts, Inc.
W76-12144

REDOX POTENTIALS IN SOIL COLUMNS INTERMITTENTLY FLOODED WITH SEWAGE WATER,
Mississipi State Univ., State College. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W76-12145

COLORIMETRIC DETERMINATION OF PARAQUAT RESIDUES IN SOIL AND WATER,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
J. D. Pope, Jr., and J. E. Benner.
J Assoc Off Anal Chem. 57(1); p 202-204, 1974.

Descriptors: *Pesticide residues, *Pollutant identification, *Colorimetry, *Agricultural runoff, *Paraquat, Herbicides, Analytical techniques, Soil analysis, Water analysis.

A modified colorimetric method is presented for the determination of paraquat in agricultural runoff samples. The soil extraction step of existing methods is shortened, making the method more suitable for routine analysis of large numbers of samples. Recoveries from spiked soil samples (0.5-5.0 ppm) and water samples (0.1-2.0 ppm) averaged 91-98 and 80-94%, respectively.--Copyright 1974, Biological Abstracts, Inc.
W76-12149

5B. Sources Of Pollution

CONTRIBUTION TO THE STUDY OF STORM WATER IN URBAN ENVIRONMENT (CONTRIBUTION A L'ETUDE DES EAUX DE RUISSELLEMENT EN MILIEU URBAIN),
For primary bibliographic entry see Field 5A.
W76-11637

A PRELIMINARY EVALUATION OF THE CHEMICAL CHARACTER OF WATER NEAR THE NORTHWEST SHORE OF TOPAZ LAKE, DOUGLAS COUNTY, NEVADA,
Geological Survey, Carson City, Nev.
For primary bibliographic entry see Field 5A.
W76-11674

EFFECT OF ATMOSPHERIC STABILITY ON WATER TEMPERATURE PREDICTIONS FOR A THERMALLY LOADED STREAM,
Pennsylvania State Univ., University Park. School of Forest.
D. R. DeWalle.
Water Resources Research, Vol. 12, No. 2, p 239-244, April 1976. 3 fig, 2 tab, 19 ref. OWRT C-4199(No. 9032)(2).

Descriptors: *Model studies, *Energy budget, *Water temperature, *Heat transfer, *Discharge(Water), Air-water interfaces, Air temperature, Humidity, Wind velocity, Radiation, Equations, Pennsylvania, Atmosphere, *Thermal pollution.
Identifiers: *Atmospheric stability, *Shulyakovskiy equation, *Hefner equation, *Susquehanna River(West branch).

A steady state one-dimensional energy budget equation was numerically integrated to predict water temperatures in a 5.45-km-long thermally loaded stream reach for 131 five- or six-hour periods. Downstream water temperature prediction errors (measured minus predicted) using Jobson's Lake Hefner evaporation equation averaged -2.11 C and were well correlated (R2 = 46%) with an index to atmospheric stability. Use of a modified form of Shulyakovskiy's evaportion equation, which includes a term for evaporation by free convection, significantly reduced the average prediction error to 0.89 C and eliminated the effects of atmospheric stabilty (R2 less than 1%). Correction of wind velocity data for the velocity of the air relative to the stream velocity also reduced prediction errors. (Lardner - ISWS)
W76-11690

BACTERIAL POPULATIONS OF AQUATIC SYSTEMS RECEIVING DIFFERENT TYPES OF STRESS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 5C.
W76-11704

CHRONIC OIL CONTAMINATION AND AQUATIC ORGANISMS WITH EMPHASIS ON DIPTERA: STATUS AND BIBLIOGRAPHY,
Vermont Univ., Burlington. Dept. of Entomology.
For primary bibliographic entry see Field 5C.
W76-11709

HYDROCARBONS IN THE SARGASSO SEA SURFACE MICROLAYER,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
T. L. Wade, and J. G. Quinn.
Marine Pollution Bulletin, Vol. 6, No. 4, 1975. p. 54-57, 1 tab., 19 ref.

Descriptors: Oil, *Oil spills, *Oil pollution, *Oil-water interfaces, *On-site investigations, *On-site data collections, Water analysis, Absorption, Methodology, Infrared spectrometry, Water pollution sources.
Identifiers: *Sargasso Sea, *Pelagic tar, Surface micro-layers.

Small particles of weathered pelagic tar are suggested as a major source of hydrocarbons found in surface microlayer and subsurface water sample collected in the Sargasso Sea. (Katz)
W76-11710

POLLUTION OF THE MEDITERRANEAN AROUND NAPLES,
Durham Univ. (England). Dept. of Botany.
C. R. C. Sheppard, and D. J. Bellamy.
Marine Pollution Bulletin, Vol. 5, No. 3, 1974, p. 42-44, 2 tab., 3 fig., 3 ref.

Descriptors: *Lead, *Zinc, *Copper, *Oil pollution, Invertebrates, Chemical analysis, *Marine benthos, Sewage, Nickel, Manganese, Mussels, *Molluscs, Bays.
Identifiers: *Mediterranean Sea, *Bay of Naples, *Castellabate, Sea urchins, Paracentrotus, Arbacia, Tissue content, *Mytilus, Italy.

The Mediterranean has a reputation for being highly polluted, and the cholera outbreak in southern Italy last year added to the concern about the condition of that sea. There have, however, been few biological surveys. An unpolluted area south of Naples has been declared a national park, to monitor the health of the Mediterranean in that area. This report compares conditions there with those in the Bay of Naples. (Katz)
W76-11713

SELENIUM AND HEAVY METALS IN BLACK MARLIN,
Chief Secretary's Dept., Sydney (Australia). New South Wales Fisheries Branch.
For primary bibliographic entry see Field 5C.
W76-11716

EXPORT OF LEAD FROM SALT MARSHES,
Marine Biological Lab., Woods Hole, Mass. Boston Univ. Marine Program.
M. Banus, I. Valiela, and J. M. Teal.
Marine Pollution Bulletin, Vol. 5, No. 1, 1974, p. 6-9, 2 tab., 2 fig., 21 ref.

Descriptors: *Lead, *Heavy metals, Water pollution sources, *Marshes, *Marsh plants, *Sediments, *Salt marshes, Nitrogen, Grassed waterways, Grasses, Tidal effects, Tidal marshes, Tidal streams, Estuarine environment, Massachusetts.
Identifiers: Salt marsh sediments, Saltwater cardgrass, Spartina alterniflora.

Lead accumulates in shallow salt marsh sediments and is taken up by grasses. Since about half of the annual grass crop is transported to the sea after the grass dies, this may contribute to the movement of lead to deeper waters. Where nitrogen additions increase the biomass of grasses, or where very heavy lead contamination takes place, substantial amounts of lead may be removed by tides from the marsh surfaces. (Katz)
W76-11717

MERCURY CONTENT OF MUSSELS FROM WEST EUROPEAN COASTS,
Central Lab. TNO, Delft (Netherlands).
P. DeWolf.
Marine Pollution Bulletin, Vol. 6, No. 4, 1975, p. 61-63, 5 tab., 1 fig., 2 ref.

Descriptors: *Mussels, *Molluscs, *Commercial shellfish, *Marine fish, Food, Atlantic Ocean, Benthic fauna, *Metals, Intertidal areas, *Mercury.
Identifiers: Mytilus edulis, Mytilus galloprovincalis, France, North Sea, Denmark, England, Scotland, Rhine estuary, Belgium, Germany.

Mussels have been sampled from the east side of the North Sea from Arcachon in France to Cape Skagen in Denmark and on the west side from Lands End to Edinburgh. High levels of mercury occur in mussels taken from the vicinity of the Rhine and Eems Dollard, and values on the British coast are generally higher than on the east side of the North Sea. (Katz)
W76-11718

PLASTIC PARTICLES FOUND IN TERN PELLETS, ON COASTAL BEACHES AND AT FACTORY SITES,
American Museum of Natural History, New York.
H. Hays, and G. Cormons.
Marine Pollution Bulletin, Vol. 5, No. 3, 1974, p. 44-46, 2 fig.

Descriptors: *Industrial wastes, Environmental effects, Marine animals, *Birds, *Gulls, *Waterfowl, *Shore birds, Beaches, Seashores, Atlantic Ocean, *Food chains, Sewage, *Plastics.
Identifiers: *Polystyrene, *Terns, Tern pellets.

Small polystyrene particles, evidently of industrial origin, now appear as a contaminant of the sea in several parts of the world. They have been discovered in pellets of indigestible food regurgitated by gulls and terns, so are clearly entering the food chain at some point. So far as is known, they are harmless but it would be as well to exercise caution in releasing plastic to the environment. (Katz)
W76-11720

SEASONAL VARIATION OF DISSOLVED METALS IN INSHORE WATERS OF THE MENAI STRAITS,
University Coll. of North Wales, Bangor. Marine Science Labs.
A. W. Morris.
Marine Pollution Bulletin, Vol. 54, No. 4, 1974, p. 54-59, 7 fig., 14 ref.

Descriptors: *Heavy metals, *Sea water, *Seasonal variability, *Salinity, *Water temperature, Analytical procedures, Chlorophyll, Zinc, Copper, Nickel, Manganese, Dissolved solids, Ions.
Identifiers: *Ionic zinc, Organically associated zinc, Ionic copper, Organically associated copper, Ionic manganese.

Many surveys of trace contaminants of seawater are based on the supposition that the situation is static. Little is known about seasonal fluctuations in the concentrations of these contaminants and less about the cause of this variation. Fluctuation in freshwater carrying metals or sediment that will trap contaminants, changes in movements of water masses in the sea, as well as the use of trace metals by marine organisms, are all contributory factors. Local hydrography, seasonal variability and physico-chemial state cannot be neglected in studies of the occurrence of dissolved trace metals in coastal waters. (Katz)

W76-11722

FORECASTING THE DANGER OF ORGANIC COMPOUNDS IN THE ENVIRONMENT, (IN RUSSIAN),
For primary bibliographic entry see Field 5C.
W76-11734

ON THE PROROCENTRUM RED TIDE OCCURRED IN THE COASTAL WATERS OF TOYOURA, FUNKA BAY, HOKKAIDO, IN SEPTEMBER, 1973, (IN JAPANESE),
For primary bibliographic entry see Field 5C.
W76-11740

A THREE-DIMENSIONAL NUMERICAL MODEL OF THE ESTUARY CIRCULATION AND SALINITY IN NARRAGANSETT BAY,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 2L.
W76-11746

A MODEL OF TURBULENT DIFFUSION,
Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering; and Technische Hogeschool, Delft (Netherlands). Lab. of Fluid Mechanics.
For primary bibliographic entry see Field 2E.
W76-11770

USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER RESOURCES PLANNING AND MANAGEMENT IN NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. of Geosciences.
For primary bibliographic entry see Field 5A.
W76-11773

WASTE INJECTION INTO THE HAWAIIAN GHYBEN-HERZBERG AQUIFER: A LABORATORY STUDY USING A SAND-PACKED HYDRAULIC MODEL,
Hawaii Univ., Honolulu. Water Resource Research Center.
S. W. Wheatcraft, F. L. Peterson, and D.L. Heutmaker.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-257 060, $5.00 in paper copy, $3.00 in microfiche. Technical Report No. 96, February 1976. 88 p, 30 fig, 1 tab, 28 ref, 2 append. OWRT B-038-HI(2), 14-31-0001-5068, 14-31-0001-5011.

Descriptors: *Waste disposal, *Groundwater, *Injection, Laboratory tests, *Model studies, *Hawaii, Simulation analysis, Saline water-freshwater interfaces, Aquifer characteristics.
Identifiers: *Ghyben-Herzberg aquifer, *Sand-packed model, Buoyant plume, Injection rates, Saline water entrainment, Plume mechanics.

Injection of wastes into the Hawaiian subsurface environment presents unique problems because the waste effluent normally are injected into the salt or brackish water underlying the fresh Ghyben-Herzberg lens. Because waste water commonly has approximately the same density as fresh water, in addition to any ambient groundwater flow effects, a buoyant uplift is produced which causes the injected waste to move upward and outward from the injection point as a buoyant plume. A laboratory sand-packed hydraulic model was used to study the mechanics of buoyant plume movement, and the entrainment of salt water by the plume. Simulated waste effluent was injected into a density-stratified aquifer system under static groundwater conditions, and the effects on plume mechanics of varying several different injection parameters, such as injection depth, injection rate, type of injection source, density of receiving water, etc., were observed. The laboratory studies indicated that the depth of injection with respect to the salt-fresh interface had the greatest effect on plume mechanic of any of the injection parameters varied. Variation of injection rate had the next greatest effect. It also was observed that for the conditions stipulated in this study, very little salt water was entrained by the injected waste effluent and, thus, the buoyant plume was observed to rise well into the fresh-water zone.
W76-11777

NITROGEN CYCLING IN MICROCOSMS AND APPLICATION TO THE BIOLOGY OF THE NORTHERN ARM OF THE GREAT SALT LAKE,
Utah State University, Logan. Dept of Biology.
For primary bibliographic entry see Field 5C.
W76-11778

PUBLIC LAW 92-500: TECHNOLOGY ASSESSMENT, TECHNICAL VOLUME.
National Commission on Water Quality, Washington, D.C. Technology Assessment Sector.
For primary bibliographic entry see Field 5G.
W76-11780

EVALUATION OF SLUDGE DUMPING OFF DELAWARE BAY,
Delaware Univ., Lewes. Coll. of Marine Studies.
L. Watling, W. Leatham, P. Kinner, C. Wethe, and D. Maurer.
Marine Pollution Bulletin, Vol. 5, No. 3, 1974, p 39-42, 3 tab, 1 fig, 9 ref.

Descriptors: *Marine animals, *Sediments, Sludge, *Sludge disposal, *Sewage sludge, *Trace elements, *Environmental effects, Atlantic Ocean, Sewage disposal, Benthos, Invertebrates, Delaware, Mollusks, Statistical analysis, Organic matter.
Identifiers: *Sludge characteristics, *Sludge dumping, Diversity values, Correlation coefficients, *Nucula proxima, *Delaware Bay.

Sewage sludge from Philadelphia and Camden has been dumped off the mouth of Delaware Bay since 1961. Local residents have claimed that sludge is washed ashore, is a health hazard and has impoverished the fauna of the seabed in the area. An assessment has been made of the composition and abundance of the benthic marine fauna of the dumping grounds. The results suggest that dominant species of the area are changing as particulate organic matter accumulates. (Katz)
W76-11792

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA. PART III. THERMAL TOLERANCE AND SEDIMENT TOXICITY STUDIES,
University of Southern California, Los Angeles. Allan Hancock Foundation.
For primary bibliographic entry see Field 5C.
W76-11793

CAESIUM-137: ITS ACCUMULATION IN A LITTORAL COMMUNITY,
University of Manchester Inst. of Science and Technology (England). Pollution Research Unit.
For primary bibliographic entry see Field 5C.
W76-11808

POLYSTYRENE SPHERULES IN THE SEVERN ESTUARY-A PROGRESS REPORT,
Bath Univ. (England). School of Biological Sciences.
S. Kartar, F. Abou-Seedo, and M. Sainsbury.
Marine Pollution Bulletin, Vol. 7(3), 1976, p. 52, 1 tab, 1 ref.

Descriptors: *Sediments, *Organic wastes, *Decomposing organic matter, *Sludge, *Demersal fish, *Path of pollutants, Marine fish, Estuarine fish, *Food habits, *Industrial wastes, Pollution effects, Seasonal.
Identifiers: Polystyrene, *Polystyrene spherules, Stomach contents, Sediment content, *Flounders, Sand gobies, Sea snails, *Severn Estuary, *Bristol Channel, England.

The amount of polystyrene in the mud and sediments of the Severn Estuary and Bristol Channel and in the gut of bottomfish is reduced in 1974 from the amounts observed in 1973. (Katz)
W76-11819

SAND FLATHEAD (PLATYCEPHALUS BASSENSIS) AN INDICATOR SPECIES FOR MERCURY POLLUTION IN TASMANIAN WATERS,
Tasmanian Dept. of Agriculture, Hobart (Australia). Sea Fisheries Div.
T. G. Dix, and A. Martin.
Marine Pollution Bulletin, Vol. 6(9), 1975, p. 142-143, 1 tab, 1 fig.

Descriptors: *Metals, *Mercury, *Path of pollutants, *Marine fish, *Bioindicators, *Tracers, *Demersal fish, Biochemistry, Physiology, Sites.
Identifiers: *Site dependence, Mercury concentration, Tissue mercury concentration, Fish size, *Tasmania, Sand flathead, Platycephalus bassensis.

A state-wide survey of Tasmanian coastal waters has shown that Platycephalus bassensis, a widespread, easily caught, non-migratory demersal finfish, is a useful indicator species for mercury pollution. Using approximately twelve fish at each of 31 locations, the mean total mercury concentration in the muscle tissue ranged from 0.03 to 1.06 mg/kg (fresh wt basis), and clearly demonstrated a site dependence for mercury uptake in this species. The correlation between mercury concentration and fish size is shown to be valid only if the effect of location is taken into account. Even then, size accounts for only about 10% of the total variability in mercury concentration. (Katz)
W76-11820

REGIONAL CHARACTERISTICS OF THE TOTAL DISSOLVED MINERALS IN STREAM WATERS IN ILLINOIS,
Northern Illinois Univ., DeKalb. Dept. of Geology.
For primary bibliographic entry see Field 5A.
W76-11857

A COMPARISON OF PHOSPHORUS AND WATER CONTRIBUTIONS BY SNOWFALL AND RAIN IN NORTHEAST OHIO,
Kent State Univ., Ohio. Dept. of Geology.
M. R. McComas, G. D. Cooke, and R. H. Kennedy.
Water Resources Bulletin, Vol. 12, No. 3, p 519-527, June 1976. 2 fig, 2 tab, 15 ref. EPA R801936.

Descriptors: *Phosphorus, *Snowfall, *Phosphates, *Rainfall, *Phosphorus compounds, *Ohio, Analytical techniques, Chemistry, Water pollution sources, Snow, Snowmelt, Surface runoff, Rain, Meteorology, Water sources, Weather, Runoff, Rain water, Storm runoff, Precipitation(Atmospheric), Data collections, Watershed management.
Identifiers: *Twin Lake Watershed(Ohio), Portage County(Ohio), Fine sediment, Detention basins, Lake management.

A record snowfall of 55.8 centimeters occurred on December 1 and 2, 1974, in Portage County, Ohio. An early winter thaw melted the greater part of the snow by December 22, 1974, and a two-day rain fell from December 23 to December 25. These weather events provided an opportunity to compare snowmelt and rainfall contribution to runoff

and phosphorus loading to the Twin Lakes Watershed. Phosphorus concentrations of the snow and rain were determined. Six lake inflows and two lake outflows were measured daily for volume and phosphorus concentration. The snow added 217,000 cubic meters of water and 2.2 kilograms of total phosphorus to the watershed. The rain added 74,000 cubic meters of water and 1.6 kilograms of total phosphorus. Total water discharge from the watershed during December was 244,537 cubic meters and total phosphorus output was 20.3 kilograms. The snow provided 49.9% of the discharge and 8% of the phosphorus whereas the rainfall contributed 28% of the discharge and 6% of the phosphorus. These results indicated that, while snow is a significant source of water, it is not a large source of phosphorus. The greatest contribution of phosphorus comes from fine sediment carried by storm runoff. (Henley - ISWS)
W76-11858

A BOUNDARY VALUE APPROACH FOR ESTUARINE WATER QUALITY MODELLING WITH RESULTS FOR JAMAICA BAY, NEW YORK,
Texas Univ. at Austin. Dept. of Electrical Engineering.
B. J. Olufeagba, R. H. Flake, and N. E. Armstrong.
Ecological Modelling (International Journal on Ecological Modelling and Engineering and Systems Ecology), Vol. 1, No. 1, p 3-30, May 1975. 13 fig, 5 tab, 37 ref.

Descriptors: *Estuaries, *Water quality, *Mathematical models, *Algorithms, Flow, Kinetics, Constraints, Equations, Numerical analysis, Hydrodynamics, Dispersion, Salinity, Simulation analysis, Coliforms, Nitrogen, Biochemical oxygen demand, Dissolved oxygen, Systems analysis, *New York, *Path of pollutants.
Identifiers: *Jamaica Bay(NY), Nonlinear models, Total soluble phosphorus.

Results of water quality modeling for Jamaica Bay, a New York estuary with a large hydraulic circulation, are presented. The two-dimensional topology is approximated by a set of coupled one-dimensional subsystems. The long term steady state water quality problem is then reformulated as a multi-point boundary value problem for ordinary differential equations. Piecewise constant dispersion parameters are estimated from salinity data. A sequential algorithm based on parallel shooting is developed for solving the multipoint problem. The method, which simplifies handling of feedforward and feedback reaction kinetics, is equivalent to employing a high order finite difference technique with the subsequent enhanced accuracy. Results of model verification for uncoupled variables -- salinity, coliform, total soluble phosphorus -- and coupled variables for nitrogen (organic and ammonia) and BOD-DO for Jamaica Bay are discussed. (Bell-Cornell)
W76-11881

MODELS IN WATER QUALITY PLANNING,
Karlsruhe Univ. (West Germany). Institut fuer Siedlungswasserwirtschaft.
R. W. Abendt.
Ecological Modelling (International Journal on Ecological Modelling and Engineering and Systems Ecology), Vol. 1, No. 3, p 205-217, September 1975. 7 fig, 11 ref.

Descriptors: *Water quality, *Mathematical models, *Simulation analysis, Data collections, Methodology, Rivers, Measurement, Flow, Water temperature, Systems analysis, Equations, Europe.
Identifiers: *Neckar River quality model(W Germany), Error, Oxygen balance, Model accuracy, Black box method.

This paper shows the range of applicability of water quality models. It clarifies the purpose of modelling with respect to the exactness of results and it investigates problems of data collection. The data quantity and objective of modelling influence the model structure, i.e., the mathematical complexity. Two principal errors are investigated: first, the error caused by the mathematical abstractions of the natural processes in a model, and on a subsequent level, the wrong parameter estimates in a model. Furthermore, the difference between a deterministic descriptive, and a statistical approach, is discussed. In both model types, input and objectives are the same. But the methodology is fundamentally different. A practical example is presented based on a two-parameter water quality model. The limits and practicability of the Neckar River quality model are discussed in this context. (Bell-Cornell)
W76-11882

SOME ASPECTS OF MODELLING THE LONG-TERM BEHAVIOUR OF AQUATIC ECOSYSTEMS,
Technical Univ. of Denmark, Lyngby. Inst. of Mathematical Statistics and Operations Research.
J. C. Behrens, J. E. Beyer, O. B. G. Madsen, and P. G. Thomsen.
Ecological Modelling (International Journal on Ecological Modelling and Engineering and Systems Ecology), Vol. 1, No. 3, p 163-198, September 1975. 28 fig, 17 ref, append.

Descriptors: *Aquatic environment, *Ecosystems, *Behavior, *Computer models, *Water pollution control, *Water quality, *Eutrophication, Fjords, Numerical analysis, Water resources, Planning, Simulation analysis, Computer programs, Waste water treatment, Costs, Optimization, Constraints, Systems analysis, Equations.
Identifiers: Sensitivity analysis, Nonlinear system, Factor decomposition approach, Reducing approach, Box model.

Considered is the modelling process in relation to the class of computerized, time-continuous, deterministic models. Following a brief discussion of the formulation of the modelling process, a description of the System Analysis and System Synthesis stages of the modeling of the eutrophication process in a sill fiord is given. Special emphasis is put on the modelling of a general column of the fiord system. Numerical solution methods relevant for long-term studies are discussed and the requirements in terms of their stability and accuracy are formulated. The goal-statements of Sensitivity Analysis are presented, followed by a description of two approaches to the understanding of model behavior. The possibility of determining the sensitivity of a nonlinear system through linearization is discussed, as is the possibility of determining the sensitivity to not well-estimated constants working directly on the nonlinear system. A means of constructing a model of the entire fiord is outlined. Finally, attention is brought to the superior modeling goals through a discussion of the utilization of a hypothetical, credible model of the eutrophication process in the fiord as an element in a tool for resource planning in pollution control. The aspects of using the ecological model in a study of water treatment plans have great importance in the process of planning investments for wastewater treatment. Alternative plans can be compared as to economy and water quality. In complex cases, mathematical programming models can be used in connection with simulation models. (Bell-Cornell)
W76-11883

ECOSYSTEM MODELING OF WATER-HYACINTH MANAGEMENT IN LAKE ALICE, FLORIDA,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 5G.
W76-11884

AN ECOLOGICAL MODEL FOR HEAVY METAL CONTAMINATION OF CROPS AND GROUND WATER,
Royal Danish School of Pharmacy, Copenhagen.
S. E. Jorgensen.
Ecological Modelling (International Journal on Ecological Modelling and Engineering and Systems Ecology), Vol. 2, No. 1, p 59-67, March 1976. 2 fig, 5 tab, 6 ref.

Descriptors: *Water pollution control, *Water quality, *Soil contamination, *Mathematical models, *Groundwater, Crops, Sludge, Soils, Soil water, Humus, Clays, Municipal wastes, Regression analysis, Computer programs, Equations, Systems analysis, *Path of pollutants, *Forecasting.
Identifiers: Metal contamination.

Presented is a model used for predicting the heavy metal concentration in crops and groundwater. The model indicates that Pb is limiting the use of sludge as a soil conditioner, and that in most cases, contamination of crops seems to be greater danger than contamination of groundwater. However, when soil with a high humus or clay content is used at a pH close to 7.00, municipal sludge can be used in considerable quantities without danger. (Bell-Cornell)
W76-11885

UNDERGROUND LIQUID WASTE DISPOSAL,
American Society of Civil Engineers, New York. Task Committee on Underground Liquid Disposal.
For primary bibliographic entry see Field 5E.
W76-11888

PLASTIC PARTICLES IN SURFACE WATERS OF THE NORTHWESTERN ATLANTIC,
National Marine Fisheries Service, Narragansett, R.I. Narragansett Lab.
J. B. Colton, Jr, F. D. Knapp, and B. R. Burns.
Science, Vol. 185, p. 491-97, 1974. 9 p, 6 fig, 1 tab.

Descriptors: *Sampling, *Plastics, *Industrial wastes, Currents(Water), *Water pollution sources, *Recreation wastes, *Path of pollutants, Biodegradation, Water pollution effects, Aesthetics, Water quality, Suspended solids, Coasts, Oceans, New York, New Jersey, Florida.
Identifiers: *Coastal waters, *Coastal zone management.

Because plastics are not biodegradable they remain indefinitely once introduced to the seas. On a recent ichthyoplankton survey ranging from Cape Cod to the Carribean, plastic sampling was taken to determine the types and concentrations of plastics. The concentration of all plastics was greatest in waters above Florida and least in the Carribean. Opaque polystyrene spherules were of greatest concentration in coastal waters south of Rhode Island and south of eastern Long Island. These spherules enter oceans only through plastic producing and processing plant waste water. Polyethylene cylinders or 'nibs' also enter the ocean from plastics plants and are found in highest concentrations off southern New York, the New Jersey coast and Delaware. In some areas the concentration of plastics is as high as 500 grams per square kilometer. Plastic prices and sheets or wrappers are the most abundant particle types and range throughout the sampling area. These plastics are non-toxic and have no major adverse effects on fish. Nevertheless, effective pollution monitoring of the plastics industry is needed to prevent improper waste water disposal. (Comer-Florida)
W76-11889

ATMOSPHERIC SULFUR: ITS EFFECT ON THE CHEMICAL WEATHERING OF NEW ENGLAND,
Dartmouth Coll., Hanover, N.H. Dept. of Earth Sciences.
For primary bibliographic entry see Field 5A.
W76-11890

EARTH'S HIDDEN ASSET, OUR MOST VALUABLE SOURCE OF WATER IS ALSO THE MOST VULNERABLE,
For primary bibliographic entry see Field 4B.
W76-11895

PETROLEUM DEGRADATION IN LOW TEMPERATURE MARINE AND ESTUARINE ENVIRONMENTS,
Rhode Island Univ., Kingston. Dept. of Plant Pathology-Entomology.
R. W. Traxler, and A. M. Cundell.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-A020 755, $3.50 in paper copy, $3.00 in microfiche. Annual Report to the Office of Naval Research No. 3, January 1976. 18 p, 5 fig, 18 ref. N00014-68-A-0215-0013.

Descriptors: *Oil pollution, *Estuarine environment, *Microbial degradation, Water pollution, Water quality control, *Microorganisms, *Biodegradation, *Environmental effects, *Biochemical oxygen demand, Aquatic environment, Bacteria, Yeasts, Fungi, Aquatic bacteria.
Identifiers: *Marine environment, *Hydrocarbons, Hexadecane, Methylcyclohexane, Penicillium sp.

A Penicillium sp. shown to utilize n-hexadecane developed intracellular deposits similar to those seen in hydrocarbon-utilizing bacteria and yeast. Scanning and transmission electron photomicrographs contrast the morphology of hexadecane and peptone grown fungi. Laboratory experiments show the capacity for bacterial isolates to utilize methylcyclohexane if provided to the culture from the vapor phase. BOD experiments confirm the capacity of natural mixed microbial flora from estuarine sources at 7C to utilize certain petroleum hydrocarbons at 10C. Inocula taken during the summer have a reduced capacity to utilize petroleum hydrocarbons at 10C and 20C. (Sinha-OEIS)
W76-11924

DEVELOPMENT OF BUOY MOUNTED HYDROCARBON VAPOR SENSORS FOR USE IN LOCAL AREA POLLUTION SURVEILLANCE SYSTEMS,
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5A.
W76-11930

EFFECTS OF FIRE ON NUTRIENT MOVEMENT IN A SOUTH CAROLINA PINE FOREST,
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
W. M. Lewis, Jr.
Ecology. 55(5), p 1120-1127, 1974.

Descriptors: *Burning, *Nutrients, *South Carolina, *Cations, *Nitrates, *Phosphates, Pine trees, Forest management, Leaching, Cation adsorption, Magnesium, Calcium, Potassium, Sodium, Sampling.

The movement of major cations, nitrate and phosphate was studied in burned and control areas of a South Carolina pine forest (USA). Artificial leaching of litter showed that fire increased the solubility of cations by the following factors: Ca ++, 20x; Mg ++, 10x; Na +, 2.3x; K +, 2.3x. Natural leaching over a 1 mo. period reduced the ion yield of burned litter by 80%-83% for divalent cations and 45%-63% for monovalent cations. Amounts of soluble nitrate and phosphate were identical in burned and unburned litter samples. Nitrate and phosphate were substantially higher in the 1st rainfall at the burned area after the burn, but not in subsequent rains. Collections of rainfall plus fallout from the burned area consistently contained about twice the amounts of cations present in similar collections from the unburned area. Runoff was low but contained greater amounts of cations in the burned area. Samples of superficial groundwater provide some evidence for changes in ionic balance due to burning. Biologically available N and P in the litter is apparently not increased directly by burning, but a rise in soluble nitrate and phosphate occurs some time after the burn and is probably due to increased microbial activity. Large amounts of N are probably volatilized and could exercise important effects on the productivity of systems remote from the burn if some biologically active compounds are included in the vapor. Although the upper soil layers are an efficient adsorption trap for cations, there is a potentially important movement of ions in runoff, in groundwater, or in the wind as particulate matter following a fire.--Copyright 1975, Biological Abstracts, Inc.
W76-11933

COASTAL ZONE POLLUTION BY OIL AND OTHER CONTAMINANTS: GUIDELINES FOR POLICY, ASSESSMENT AND MONITORING IN TROPICAL REGIONS. BASED UPON A CASE STUDY IN INDONESIA, IN 1973,
Smithsonian Institution, Washington, D. C.
P. H. Freeman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-247 431, $6.00 in paper copy, $3.00 in microfiche. Report Prepared for the Agency for International Development, Dept. of State, 1974. 144 p, 2 fig, 10 tab, refs, 3 append. AID/csd-2608.

Descriptors: *Continental Shelf, *Bibliographies, Pollutants, *Tropical regions, *Pollution abatement, *Water quality control, *Oil pollution, *Environmental effects, *Oil spills, Resources development, Monitoring, Coasts, Fisheries, Cadmium, Mercury, Insecticides, Beaches, Mangrove swamps, Management, Public health.
Identifiers: *Outer Continental Shelf, *Indonesia, Coastal zone, Pollution prevention, Policies, Guidelines, Biological effects, Organochlorine, Coral reefs.

The report provides guidelines useful to tropical nations for the prevention and control of pollution of coastal waters by oil and other contaminants. It reviews the state of knowledge on the effects of pollution by oil in warm tropical waters, sets forth information needed for determining policies for controlling coastal zone pollution by oil, outlines several policy options and their implications and presents recommendations for monitoring coastal pollution. Included in the report is an Annotated Bibliography on the Biological and Ecological Effects of Oil Pollution in Tropical Waters, compiled by C. P. Onuf. (See also W76-11936) (Sinha-OEIS)
W76-11935

THE BIOLOGICAL AND ECOLOGICAL EFFECTS OF OIL POLLUTION IN TROPICAL WATERS. AN ANNOTATED BIBLIOGRAPHY,
Smithsonian Institution, Washington, D. C. Office of International and Environmental Programs.
For primary bibliographic entry see Field 5C.
W76-11936

RESULTS OF OCEAN DIFFUSION AND BIOLOGICAL STUDIES OF THE HOLLYWOOD, FLORIDA, OCEAN OUTFALL,
Environmental Science and Engineering, Inc., Gainesville, Fla.
J. D. Crane, and R. H. Jones.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-247 684, $5.50 in paper copy, $3.00 in microfiche. U. S Environmental Protection Agency, Ecological Research Series No. EPA-600/3-76-003, January 1976. 109 p, 19 fig, 15 tab, 21 ref, 3 append. 57(RI)-01-68.

Descriptors: *Outfall sewers, *Sewage effluents, *Coliforms, *Pathogenic bacteria, Ecology, *Environmental effects, *Waste disposal, Continental Shelf, Florida, Bacteria, *Diffusion, Water pollution sources, *Path of pollutants, *Florida.
Identifiers: *Outer Continental Shelf, Hollywood(Fla).

Full-scale diffusion experiments were conducted to estimate coliform bacteria concentration patterns of sewage effluent from two ocean outfalls ocated at Pompano Beach and Hollywood, Florida. The experiments consisted of two parts: turbulent diffusion of sewage effluent, and natural die-off of coliform bacteria. For the majority of the diffusion experiments, Rhodamine dye was injected at a continuous rate into the sewage at the sewage treatment plants. Experimental determinations of coliform die-off rates indicated that during the summer months the natural die-off is approximately two orders of magnitude greater than that during the winter. The biological studies consisted of qualitative and quantitative evaluations of the microscopic algae and protozoa of the surface waters and the ocean floor to a distance of about two miles from shore. Detectable effects of the Hollywood outfall were confined to a very small mixing zone in the immediate vicinity of the outfall outlet in which a reduction of plankton was observed. Phytoplankton increase, which would be expected from nutrient enrichment, was not observed to occur as a result of the Hollywood outfall in the areas surveyed. The studies provide no indication that sewage release through the Hollywood outfall had any significant effect on aquatic ecology. (Sinha - OEIS)
W76-11938

A COMPUTER SIMULATION TECHNIQUE FOR OIL SPILLS OFF THE NEW JERSEY-DELAWARE COASTLINE,
Coast Guard Research and Development Center, Groton, Conn.
M. C. Miller, J. C. Bacon, and I. M. Lissauer.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-A018 947, $4.00 in paper copy, $3.00 in microfiche. Final Report No. USCG-D-171-75, September 1975. 48 p, 37 fig, 7 ref.

Descriptors: *Continental Shelf, *Oil spills, *Oil pollution, *Resources development, *Environmental effects, Models, Shores, Beaches, Drilling, New York, New Jersey, Delaware, Hydrodynamics, *Path of pollutants.
Identifiers: *Outer Continental Shelf, *Offshore technology, *Deepwater ports, *New York Bight, *Computer simulation.

Predictions of the movement of oil slicks and their impact locations along the shoreline of New Jersey and Delaware were determined for two potential deepwater ports and two potential drilling sites. A hydrodynamical-numerical model for the New York Bight area was coupled with a wind generating model to produce temporal patterns of concentration of oil. Shoreline impact determinations were made for the four spill sties for the average winter storm conditions and average summer high pressure systems generated by the models. (Sinha - OEIS)
W76-11940

OIL-IN-WATER CONTENT MONITOR DEVELOPMENTAL PROGRAM SUMMARY,
Coast Guard, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5A.
W76-11941

FOLLOW-UP FIELD SURVEY OF THE OIL POLLUTION FROM THE TANKER 'METULA',
Texas A and M Research Foundation, College Station.
For primary bibliographic entry see Field 5C.
W76-11943

THE ENVIRONMENT AND THE OFFSHORE OIL INDUSTRY IN SCOTTISH WATERS - A REVIEW. PART 1. THE DEVELOPING MARITIME GEOGRAPHIC PATTERN,
Newcastle upon Tyne Polytechnic (England). Dept. of Humanities.
H. D. Smith.
Maritime Studies and Management, Vol 3, No 4, p 205-215, April 1976. 3 fig, 4 ref.

Descriptors: *Oil industry, *Resources development, *Environmental effects, *Water pollution sources, *Oil pollution, *Hazards, Exploration, Continental Shelf, Pipelines, Offshore platforms, Weather, Facilities.
Identifiers: *Outer Continental Shelf, *Scotland, *North Sea, Geographic patterns, Production facilities, Offshore technology.

The developing maritime geographic pattern with special reference to Scottish waters is examined and the relationships between the oil industry and the marine and coastal environments are considered. Important geographical reasons exist for discussing the offshore oil industry primarily with respect to Scotland. First, substantial parts of both proved and potential oil provinces lie in Scottish waters. Sea-bed topography and the configuration of land and sea on a North-West European scale are further reasons why Scotland together with North-East England has become the primary focus of the offshore oil industry of Europe. To understand the relationships between the oil industry and the environment in these areas, several overlapping phases of development must be recognized. First is the exploratory phase which concerns the discovery or delineation of petroleum reserves, associated with the build-up of the service industry in the wider sense and the forging of links with ancillary industries in the manufacturing and service sectors of the economy. The second phase concerns the manufacture and installation of production facilities, associated with the establishment of specialist industries such as production platform construction and pipe-coating; offshore engineering tasks such as pipeline laying and the placing of production platforms and other equipment on the sea bed; and the construction of tanker and gas terminals. The third phase is production. At present the industry is involved in both exploration and the installation of the first production facilities. The pipelines and platforms have already had an impact upon the fishing industry. (See also W76-11946) (Sinha-OEIS)
W76-11945

THE ENVIRONMENT AND THE OFFSHORE OIL INDUSTRY IN SCOTTISH WATERS - A REVIEW. PART 2. THE REGIONAL PATTERN OF DECISION MAKING,
Newcastle upon Tyne Polytechnic (England). Dept. of Humanities.
H. D. Smith.
Maritime Studies and Management, Vol 3, No 4, p 217-220, April 1976. 5 ref.

Descriptors: *Continental Shelf, *Oil industry, *Environmental effects, *Resources development, *Water pollution sources, *Oil pollution, *Decision making, Regions, Regional analysis.
Identifiers: *Outer Continental Shelf, *Scotland, *North Sea, Production facilities, Environmental impact.

This part of the two part review presents an account of the regional pattern, in which the relationship between decision-making and environmental factors are outlined. Clear conflicts of interest have emerged in most of the platform-yard projects between those concerned with conservation of the environment and safeguarding of local community interest on the one hand, and those representing the interest of business and sometimes government on the other. From the environmental point of view, the regional development of the oil industry falls into two contrasting areas. Existing and projected large-scale developments, often on old industrial sites around the Forth, Clyde, and in north-east England, are generally welcomed as diversifying existing industry and employment, thus providing the basis for a sounder regional economy. The second group of regions are those in which pressure of development is greatest and is likely to revolutionize the social and economic structure as well as having several environmental repercussions. Many of the peripheral land areas near the petroleum provinces are remote from major centres of population and industry, as well as being areas of high amenity value. The marine environment itself is also in danger from pollution. While the Inner Sound area falls into this category, and the lochs of the Clyde will be affected considerably, there are undoubtedly three major regions in which environmental and indeed social impact are relatively very great. These are north-east Scotland, the Cromarty Firth and Shetland. The environmental issues and their implications in each of the three areas are discussed. (See also W76-11945) (Sinha - OEIS)
W76-11946

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 5, ANALYSIS OF OIL SPILL STATISTICS.
Massachusetts Inst. of Tech., Cambridge, Mass.
For primary bibliographic entry see Field 6G.
W76-11954

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 5. OIL SPILL TRAJECTORY STUDIES FOR ATLANTIC COAST AND GULF OF ALASKA.
Massachusetts Inst. of Tech., Cambridge, Mass.
For primary bibliographic entry see Field 6G.
W76-11955

HEAVY METALS IN ORGANISMS OF THE ATLANTIC COAST OF S.W. SPAIN AND PORTUGAL,
Bristol Univ. (England). School of Chemistry.
R. D. Stenner, and G. Nickless.
Marine Pollution Bulletin, Vol. 6(6), 1975, p. 89-92, 8 tab, 4 fig, 5 ref.

Descriptors: *Copper, *Lead, *Zinc, *Mercury, *Marine animals, Shores, *Mussels, *Clams, *Crustaceans, *Oysters, Atlantic Ocean, Beaches, Mud flats, Estuaries, Mollusks, Marine plants, Invertebrates, Benthos, Marine fish, Path of pollutants, Water pollution sources.
Identifiers: *Portugal, *Spain(Rio Tinto estuary).

Very high concentrations of copper, lead, zinc, and to a lesser extent mercury, are present in the estuary of the Rio Tinto in South-West Spain. At the mouth of the estuary, the concentrations of these metals fall very sharply towards the natural levels of these metals in organisms living in this part of the Atlantic. (Katz)
W76-11961

ARSENIC IN MARINE ORGANISMS FROM WEST GREENLAND,
B. C. Research Ltd., Vancouver.
For primary bibliographic entry see Field 5C.
W76-11962

TRACE METAL CONTENT IN THE AMERICAN OYSTER,
National Marine Fisheries Service, Milford, Conn. Milford Lab.
For primary bibliographic entry see Field 5C.
W76-11964

DISTRIBUTION OF SOME TRACE METALS IN POOLE HARBOUR, DORSET,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
C. R. Boyden.
Marine Pollution Bulletin, Vol. 6(12), 1975, p. 180-186, 8 tab, 3 fig, 19 ref.

Descriptors: *Aquiculture, *Metals, *Oysters, Estuarine environment, *Cadmium, *Cobalt, *Copper, *Iron, *Lead, *Manganese, *Nickel, *Zinc, Water quality, Shellfish farming, *Clams, *Mussels, Aquatic algae, Sediments, *Trace elements, Path of pollutants, Distribution.
Identifiers: Poole Harbour, Dorset, *Oyster hatchery, Trace element concentrations, English Channel, Ulva, Mytilus edulis, Cockles.

Geochemical investigations in Poole Harbour and its tributary drainage were begun in 1969. In that study the relationships between trace elements concentrations of water and sediments were examined within several estuaries utilized by the oyster industry. Unexpectedly, elevated levels of cadmium were recorded in waters from the harbour at Poole, which could not be related to the geochemical characteristics of the input drainage. An oyster hatchery established at Poole moved, in March 1972, to a new site within Poole town, and immediately encountered problems in the rearing of larvae. As elevated cadmium concentrations had already been recorded in the upper harbour waters a more detailed examination of the distribution of trace metals in the vicinity of the hatchery was initiated. Concentrations of cadmium, cobalt, copper, iron, lead, manganese, nickel and zinc in waters, sediments and biota of Poole Harbour are reported. (Katz)
W76-11965

NITRATE POLLUTION AND THE CALIFORNIA ENVIRONMENTAL QUALITY ACT: THE APPROPRIATE SOLUTION TO A NEGLECTED PROBLEM,
For primary bibliographic entry see Field 5G.
W76-11981

DISTRIBUTION AND ABUNDANCE OF THE POLYCHAETOUS ANNELIDS IN A SOUTH FLORIDA ESTUARY,
University of South Florida, Tampa. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W76-11987

THE BATTLE OF LAKE SUPERIOR: RESERVE MINING'S BIG SEWER,
For primary bibliographic entry see Field 5G.
W76-12020

TRANSFORMATIONS OF METHYLAMINES AND FORMATION OF A HAZARDOUS PRODUCT: DIMETHYLNITROSAMINE, IN SAMPLES OF TREATED SEWAGE AND LAKE WATER,
International Inst. of Tropical Agriculture, Ibadan (Nigeria).
A. Ayanaba, and M. Alexander.
J Environ Qual. 3(1), p 83-89, 1974.

Descriptors: *Organic compounds, *Sewage, Lakes, Nitrogen, Hydrogen ion concentration, Ammonia, Nitrates, Nitrites, Microorganisms, Fungicides, Gas chromatography, *Pollutant identification.
Identifiers: Carcinogens, *Methylamines, *Dimethylnitrosamine, *Amines, Thiram.

Added trimethylamine is converted to dimethylamine in samples of raw sewage and lake water, and the secondary amine thus formed or added dimethylamine disappears with time. The rates of formation and disappearance of

dimethylamine are governed by the pH and the type and amount of inorganic N present. Ammonium is generated from both of the amines. Dimethylnitrosamine, a potent carcinogen, is formed in small amounts in samples of sewage and lake water receiving dimethylamine and nitrite, the maximum nitrosamine level detected rising with increasing acidity and increasing dimethylamine and nitrite concentrations. Dimethylnitrosamine also appears in sewage and lake water samples receiving trimethylamine. Microorganisms are involved in some stage of the conversion of the tertiary amine to the secondary amine and dimethylnitrosamine in sewage because these products are not found in sterilized sewage. The fungicide thiram (tetramethylthiuram disulfide) is converted to dimethylamine in sterilized sewage at pH 4.0, and small amounts of dimethylnitrosamine are also produced in the presence of nitrite; the yields of both products are far greater in nonsterile, thiram-amended sewage. The identification of dimethylnitrosamine was verified by thin-layer and gas chromatography, UV and IR spectrometry, and combined gas chromatrophy-mass spectrometry.--Copyright 1974, Biological Abstracts, Inc.
W76-12141

ADSORPTION OF PICLORAM (4-AMINO-3,5,6-TRICHLOROPICOLINIC ACID) ON PANOCHE, EPHRATA, AND PALOUSE SOILS: A THERMODYNAMIC APPROACH TO THE ADSORPTION MECHANISM,
California Univ., Davis. Dept. of Water Science and Engineering.
J. W. Biggar, and M. W. Cheung.
Soil Sci Soc Am Proc. 37(6), p 863-868, 1973.

Descriptors: *Adsorption, *Amino acids, *Loam, Clays, Entrophy, Euthalpy, Thermodynamics, *Soil analysis, Pesticides, Path of pollutants, *Pesticide resudes.
Identifiers: *Picloram, Picolinic-Acid.

The adsorption of picloram (4-amino-3,5,6-trichloropiconlinc acid) was studied on Panoche clay loam (at pH 4.2 and 1.2), Ephrata sandy loam, and Palouse silty loam. The adsorption processes could be described by the Freundlich equation with Freundlich constants, K, 1/n, and percentage of adorption at 25C: respectively, 0.210, 0.92, and 3-5.6% for Panoche at pH 4.2; 2.5, 0.93, and 30% for Panoche at pH 1.2; 0.172, 0.99, and 1.9-3.6% for Ephrata; and 1.74, 0.92, and 26-33% for Palouse. Also evaluated were the standard free energy, entropy, and enthalpy associated with the adsorption processes. The values of delta G (Kcal/mol), delta S (cal/mol per degree), and delta H (kcal/mol) were: respectively, -1.2 + 0.1, -14 + 2, and -5.3 + 0.6 for Panoche at pH 4.2; -2.98 + 0.05, -59 + 2, and -20 + 1 for Panoche at pH 1.2; -180 + 0.06, -24 + 3, and -9 + 1 for Ephrata; and -3.11 + 0.05, -3.3 + 1.5, and -4.1 + 0.4 for Palouse. Thermodynamic parameters were useful in assigning adsorption mechanisms to the four picloram-adsorbent-water systems.--Copyright 1974, Biological Abstracts, Inc.
W76-12142

REDOX POTENTIALS IN SOIL COLUMNS INTERMITTENTLY FLOODED WITH SEWAGE WATER,
Mississipi State Univ., State College. Dept. of Agronomy.
F. D. Whisler, J. C. Lance, and R. S. Linebarger.
J Environ Qual. 3(1), p 68-74, 1974.

Descriptors: *Sewage, *Oxidation-reduction potential, Soils, Denitrification, Flooding, Sewage effluents, Soil analysis, *Pollutant identification.

Platinum blacked, platinum wire redox potential probes detected the possibility of denitrification when properly placed in soil columns intermittently flooded with secondary sewage effluent. The evolution of gases from the flooded soil column containing 98% N2 verified the detection. When additional soluble C was added to the sewage water, the redox potential dropped to more negative values (-200 mV) than when ordinary sewage water (+200 mV) was used, indicting that the oxidation states of other elements besides N were changing. The probes functioned for as long as 6 mo. in place without loss of sensitivity.--Copyright 1974, Biological Abstracts, Inc.
W76-12145

5C. Effects Of Pollution

DISINFECTION, DECHLORINATION AND TOXICITY TO FISH,
International Pacific Salmon Fisheries Commission, Cultus Lake (British Columbia). Sweltzer Creek Salmon Research Lab.
J. A. Servizi, and D. W. Martens.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 34-44. 4 tab, 18 ref.

Descriptors: *Chlorination, *Toxicity, *Mortality, *Sewage treatment, *Sockeye salmon, Bioassay, Treatment facilities, Fish, Sewage treatment effluents, Water pollution effects.
Identifiers: *Dechlorination.

Studies on chlorine toxicity to fish are reviewed, with particular emphasis on the effect of chlorine disinfection during primary sewage treatment. Continuous flow bioassays on sockeye salmon fingerlings exposed to various dilutions of sewage before and after chlorination revealed that chlorine residuals sufficient to meet disinfection criteria substantially increased the toxicity of the primary effluent. A chlorine concentration of 25% (by volume) in the primary effluent generally resulted in the death of juvenile sockeye within about 96 hours. Chlorination caused a decrease in the average mean survival time from 293 minutes to 32 minutes. Dechlorination using sulfur dioxide brought the mean survival time from 32 minutes up to 434 minutes. Although a comparison of the mean survival times of primary and dechlorinated sewage suggests that the process of chlorination-dechlorination removes more toxicity than that caused by chlorine addition alone, the result is of limited practical significance since the lowest concentration at which mortalities occurred was the same (17% by volume) for both effluents. (See also W76-11249) (Kreager-FIRL)
W76-11645

VIRAL CONTAMINATION OF THE WATER ENVIRONMENT, AN UNDERESTIMATED PROBLEM,
Canada Centre for Inland Waters, Burlington (Ontario).
M. S. Mahdy.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 45-64. 1 fig, 7 tab, 31 ref.

Descriptors: *Viruses, *Sewage treatment, *Public health, *Water quality, Water pollution effects, Urine, *Waste water treatment, Infection, Microorganisms, Aquatic microbiology, Diseases.
Identifiers: Feces, Human wastes.

Potential hazards associated with viral contamination of the water environment are discussed. Human viruses shed in the feces and urine have been repeatedly detected in sewage, effluents, and water bodies receiving effluent streams; their presence appears to be due to incomplete inactivation during sewage and water treatment. Viruses that are shed in the feces and/or urine of man include the entero-, adeno-, reo-, cytomegalo, and orbi-viruses as well as hepatitis. With the exception of three types of polioviruses, there are no vaccines available for use by potentially exposed populations. Virus removals in waste water treatment may range from 50-99.9%, depending on the type of treatment. The relatively long survival times of viruses combined with the fact that very small amounts of viruses are capable of infecting a susceptible host suggest the need for increased emphasis on evaluating the types of viruses circulating in communities and the efficiency of sewage treatment techniques. (See also W76-11249) (Kreager-FIRL)
W76-11646

EVALUATION OF TOXICITIES AND ENVIRONMENTAL IMPACT IN 'SYMBIOTIC' WATER REUSE SYSTEMS,
For primary bibliographic entry see Field 5D.
W76-11665

A FICKIAN ANALYSIS OF LAKE SEDIMENT UPSURGE,
Arkansas Univ., Fayetteville. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 2J.
W76-11692

FACTORS INFLUENCING NITRATE TRANSFORMATIONS IN SEDIMENTS,
Purdue Univ., Lafayette, Ind. Agricultural Experiment Station.
R. E. Terry, and D. W. Nelson.
Journal of Environmental Quality, Vol. 4, No. 4, p 549-554, October-December 1975. 7 tab, 16 ref. OWRT A-019-IND(5)

Descriptors: *Nitrification, *Denitrification, *Eutrophication, *Nitrates, Temperature, Sediments, Aeration.
Identifiers: *Immobilization.

The effects of environmental and procedural factors (e.g., aeration, size of sample water/sediment ration, nitrate concentration, glucose addition, temperature, and sterilization) on denitrification in lake and reservoir sediments were evaluated by incubation nitrate-amended natural sediments in the laboratory. The standard laboratory procedure adopted for denitrification studies involved the incubation of small samples of sediment (undried) after addition of a nitrate solution. Denitrification in sediment-water samples was not enhanced by continuously purging samples with helium to create artificial anaerobic conditions. Even though glucose additions enhanced denitrification by 25 to 30%, unamended sediments contained sufficient available organic-D for near maximal rates of denitrification. Denitrification in sediments increased with increasing temperature over the range of 5 to 23C. However, significant denitrification occurred at temperatures as low as 5C. The evaluation of factors affecting denitrification in sediment show that the environmental conditions likely to exist in natural sediments are suitable for denitrification. Anaerobiosis and the high organic matter of most sediments create an ideal environment for microbial denitrification. The levels of nitrate in surface water may in part be controlled naturally by denitrification in sediments. (Skogerboe-Colorado State)
W76-11700

BACTERIAL POPULATIONS OF AQUATIC SYSTEMS RECEIVING DIFFERENT TYPES OF STRESS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
D. S. Cherry, R. K. Guthrie, and R. S. Harvey.
Water Resources Bulletin, Vol. 10, No. 5, p 1009-1016, October 1974. 1 fig, 3 tab, 7 ref. OWRT A-022-SC(10).

Descriptors: Freshwater, *Streams, *Bacteria, *Thermal stress, Effects, Pollutants, *Chemical wastes, Water temperature, Sampling, Effluents, Assessment, Water pollution effects.

Identifiers: *Chemical stress, Aquatic systems, Flowing streams.

Bacterial populations in a fast flowing stream receiving chemical wastes and in a slower flowing pond receiving a thermal addition 3-5 C above ambient temperature were compared with populations in a nonpolluted converging stream and an adjacent unheated pond. Parameters measured were total aerobic heterotrophic bacteria, bacterial diversity, percent chromagens of the total bacterial populations, and water temperature. Analyses of monthly samples plated on dilute Standard Plate Count Agar indicated that chemical additives to the waste stream significantly decreased the percent of chromagenic bacteria, and that thermal stress significantly altered total counts and bacterial diversity in the flowing pond. The effects of potential pollutants on these aquatic systems were assessed and are discussed on the basis of results obtained over a 16-month period. (Bell-Cornell)
W76-11704

CHRONIC OIL CONTAMINATION AND AQUATIC ORGANISMS WITH EMPHASIS ON DIPTERA: STATUS AND BIBLIOGRAPHY,
Vermont Univ., Burlington. Dept. of Entomology.
B. L. Parker, J. D. Brammer, M. E. Whalon, and W. O. Berry.

Descriptors: Water Pollution Effects, *Oil Pollution, *Oil wastes, *Bibliographies, *Reviews, *Diptera, *Aquatic insects, *Water pollution sources, *Oil spills, Insects, Invertebrates, Oil, Quality control.
Identifiers: Chronic oil contamination.

A brief overview on the scope and implications of aquatic oil contamination is presented. Particular emphasis is placed on the few studies that have been done with freshwater organisms. In order to facilitate future investigations on the effects of chronic oil spills on aquatic dipterans, a bibliography of related studies (194 references) is included. (Katz)
W76-11709

COMPUTATION OF LETHAL CONCENTRATIONS,
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
For primary bibliographic entry see Field 5A.
W76-11711

CHANGES IN THE ACTIVITY OF FUCOXANTHIN-EXCITED PHOTOSYNTHESIS IN THE MARINE DIATOM PHAEODACTYLUM TRICORNUTUM GROWN UNDER DIFFERENT CULTURE CONDITIONS,
Tokyo Univ. (Japan). Ocean Research Inst.
S. Shimura, and Y. Fujita.
Marine Biology, Vol. 33, p. 185-194, 1975. 2 fig, 6 tab, 28 ref.

Descriptors: *Photosynthesis, Laboratory tests, *Diatoms, Algae, *Primary productivity, *Chlorophyll, Light, Pigments, Temperature, Environmental effects, *Absorption, *Photoactivation, *Plant pigments, Biochemistry, Phytoplankton, Aquatic plants, Carbon cycle, Nutrients.
Identifiers: *Phaeodactylum sp. *Fucoxanthin.

Variation in the photosynthetic activity under monochromatic light was studied in Phaeodactylum tricornutum grown under various culture conditions, with special reference to the composition of photosynthetic pigments. Photosynthetic activity, under light-limiting conditions, was reduced when the cells were grown under strong light. The reduction was more extensive in activity resulting from fucoxanthin-excitation than in that from chlorophyll a-excitation. The diminution in activity for fucoxanthin-excited photosynthesis did not correlate with variations in the pigment content. A similar diminution was observed with chlorophyll a fluorescense upon excitation of fucoxanthin. The change was accelerated by lowering the culture temperature or limiting the supply of nitrogen source. The results were interpreted in terms of a nitrogen-deficient state for algal cells induced by strong light, low temperature or a limited supply of nitrogen. This leads to a modification of the physicochemical state of in vivo fucoxanthin, so that the excitation energy of fucoxanthin is less efficiently transferred to chlorophyll a. The significance of the phenomenon in the oceanic primary production is discussed. (Katz)
W76-11712

WILDFOWL AND POLLUTION IN THE TAY ESTUARY,
Dundee Coll. of Technology (Scotland). Dept. of Physics.
B. Pounder.
Marine Pollution Bulletin, Vol. 5, No. 3, 1974, p. 35-38, 1 tab., 3 fig., 12 ref.

Descriptors: *Birds, *Waterfowl, *Water birds, *Estuarine environment, *Mallard duck, *Mute swan, Shore birds, Sewage effluents, Common Eider duck, *Food chains, Marine animals, Migratory birds, Outfall sewers.
Identifiers: Tufted duck, Goldeneye, Dundee, *Tay estuary(Scotland).

Many British estuaries are important wintering areas for large numbers of northern European wildfowl, and some of the biggest concentrations of the birds feed off large sewer outfalls. The Scottish Ornithologists' Club is organizing a survey to locate the major outfalls along the Scottish coast and the large concentrations of wildfowl which may be dependent upon them. Detailed studies are being made of the flocks feeding off the outfalls in the Tay which serve the city of Dundee. Main findings to date in the Tay are summarized. (Katz)
W76-11714

EFFECT OF CHRONIC OIL POLLUTION ON A POLYCHAETE,
Baghdad Univ. (Iraq). Coll. of Sciences.
M-B. M. Mohammad.
Marine Pollution Bulletin, Vol. 5, No. 2, 1974, p. 21-24, 4 tab., 3 fig., 14 ref.

Descriptors: Oil, *Oily water, *Oil pollution, *Annelids, On-site investigations, Benthic organisms, Benthos, *Fouling, *Methodology, Oil spills, Water pollution effects.
Identifiers: *Fouling organisms, *Test panels, *Arabian Gulf, *Polychaetes, Kuwait, Polychaetes, Species diversity.

The tube-building polychaete Pomatoleios kraussii is an important fouling organism in the Arabian Gulf. Studies have been made of its growth and survival on plates immersed in the water at two sites at Kuwait, one subject to frequent small spillages at an oil terminal, the other free from oil pollution. The temporal sequence and diversity of other encrusting organisms has also been documented at the same sites. P. Kraussii survival decreases as the area coated with oil increases. (Katz)
W76-11715

SELENIUM AND HEAVY METALS IN BLACK MARLIN,
Chief Secretary's Dept., Sydney (Australia). New South Wales Fisheries Branch.
N. J. Mackay, M. N. Kazacos, R. J. Williams, and M. I. Leedow.
Marine Pollution Bulletin, Vol. 6, No. 4, 1975, p. 57-61, 5 tab., 21 ref.

Descriptors: *Mercury, *Selenium, Zinc, Copper, Arsenic, Cadmium, Lead, *Marine fish, *Australia, Commercial fish, Foods, Metals, *Heavy metals, Water pollution sources, Water pollution effects.
Identifiers: *Black marlin, Muscle mercury, Liver mercury, Fish size, Correlation.

Black marlin from the apparently unpolluted waters off north-eastern Australia have the highest muscle and liver concentrations of total mercury yet reported for a teleost species. Selenium concentrations are also high. There is a significant correlation between mercury and selenium concentrations, and concentrations of both those elements are significantly correlated to size of fish. Concentrations of cadmium, lead, zinc, copper or arsenic are not so correlated. The results of this study indicate there is a need for a moratorium on the use of this species for human consumption. (Katz)
W76-11716

MERCURY CONTENT OF MUSSELS FROM WEST EUROPEAN COASTS,
Central Lab. TNO, Delft (Netherlands).
For primary bibliographic entry see Field 5B.
W76-11718

TRACE METAL CONCENTRATIONS IN FUCUS FROM THE BRISTOL CHANNEL,
University Coll. of Wales, Aberystwyth. Dept. of Geology.
R. Fuge, and K. H. James.
Marine Pollution Bulletin, Vol. No. 1, 1974, p. 9-12. 1 fig, 2 tab, 9 ref.

Descriptors: Marine plants, *Metals, Zinc, Copper, Manganese, Iron, Nickel, Cadmium Cobalt, Molybdenum, *Algae, Atlantic Ocean, Water pollution effects, *Trace elements, Absorption.
Identifiers: *Bristol channel, *Brown seaweeds, *Fucus vesiculosus, *Trace metals.

Brown seaweeds are unable to regulate their uptake of trace metals and can therefore be used to provide a running average of metal contamination in the surrounding waters. There are many sources of error, however, and misleading results can be obtained if attention is not paid to factors that influence the metal concentrations in the weed. This becomes particularly important when comparing the results of different investigators. (Katz)
W76-11719

PLASTIC PARTICLES FOUND IN TERN PELLETS, ON COASTAL BEACHES AND AT FACTORY SITES,
American Museum of Natural History, New York.
For primary bibliographic entry see Field 5B.
W76-11720

DIETARY HABITS AND HEAVY METAL CONCENTATIONS IN FISH FROM THE SEVERN ESTUARY AND BRISTOL CHANNEL,
Bath Univ. (England).
M. W. Hardisty, S. Kartar, and M. Sainsbury.
Marine Pollution Bulletin, Vol. 5, No. 4, 1974, p. 61-63, 2 tab., 1 fig., 3 ref.

Descriptors: *Heavy metals, *Marine fish, *Path of pollutants, Commercial fish, *Zinc, *Cadmium, *Lead, Atlantic Ocean, Mullets, Feeds, Feeding rates, Diets, Channels.
Identifiers: Liparids, Bearded Rockling, Flounder, Whiting, Grey Mullet, *Bristol Channel(England).

Comparisons of the rates of growth, feeding habits and heavy metal levels of flounders from Barnstaple and Oldbury-on-Severn have shown that at all ages the fish from the North Devon coast are larger than those from the middle Severn estuary and that there are marked differences in diet. These differences in diet may contribute to the much higher zinc levels of the Barnstaple flounder samples. In the six other fish species which have been examined, there is a distinct correlation between the cadmium concentrations of the tissues and the proportion of crustaceans in the diet.

Lead concentrations appear to follow a similar trend, but no relationship could be detected between diet and tissue zinc levels. (Katz)
W76-11721

A TRACE METAL PROBLEM IN POND OYSTER CULTURE,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
C. R. Boyden, and M. G. Romeril.
Marine Pollution Bulletin, Vol. 5, No. 5, 1974, p. 74-78, 6 tab., 1 fig., 10 ref.

Descriptors: *Oysters, *Aquiculture, *Heavy metals, *Copper, *Zinc, *Path of Pollutants, Thermal pollution, Water temperature, Thermal power plants, Animal growth, *Cadmium, Cobalt, Iron, Manganese, Nickel, Lead, Sediments, Shrimp, *Marine plants.
Identifiers: Crangon vulgaris, Crassostrea gigas.

Oysters reared in power station cooling water accumulated high concentration of copper and zinc. The reasons for such elevated metal concentrations and the relevance of these observations to shellfish culture have been examined and emphasize the care that must be taken to avoid unwitting contamination of culture ponds. (Katz)
W76-11723

MERCURY ENRICHMENT IN ESTUARINE PLANT DETRITUS,
Florida State Univ., Tallahassee. Dept. of Oceanography.
E. Lindberg, and C. Harriss.
Marine Pollution Bulletin, Vol. 5, No. 6, 1974, p. 93-95, 1 tab., 18 ref.

Descriptors: *Estuarine environment, *Mercury, *Heavy metals, *Mangrove, Aquatic plants, *Plant tissue, Water pollution Food webs, Food chains, Florida, Estuaries, *Detritus.
Identifiers: *Red mangrove, Mangrove leaves, Mangrove litter, Bottom detritus.

Relative mercury concentrations are enriched by a factor of 10 in decomposition products of the red mangrove, Rhizophora mangle, compared with living plant tissue. The mercury content of mangrove detritus is 3 to 30 times higher than values reported for marine phytoplankton. Detritus formation represents a natural mechanism for mercury enrichment in estuarine food chains. (Katz)
W76-11724

GUILLEMOTS WITH DAMAGED PRIMARY FEATHERS,
Aberdeen Univ. (Scotland). Seabird Group.
W. R. P. Bourne.
Marine Pollution Bulletin, Vol. 5, No. 6, 1974, p. 88-90, 1 fig., 9 ref.

Descriptors: *Marine animals, *Oil pollution, Water pollution effects, Pathology, Oil, *Water birds, *Water fowl, *Birds, *Atlantic Ocean, *Animal pathology, Oil spills.
Identifiers: *Auks, *Guillemots, Primary feathers, Feather abnormalities.

Increasingly since the first World War, there have been observations of abnormal wearing of plumage in auks. Various reasons for this have been advanced, the most likely being the after-effects of oil pollution. (Katz)
W76-11725

INDUCTION OF ABNORMAL POLYCHAETE LARVAE BY HEAVY METALS,
California State Univ., Long Beach. Dept. of Biology.
D. J. Reish, F. Piltz, J. M. Martin, and J. Q. Word.
Marine Pollution Bulletin, Vol. 5, No. 8, 1974, p 125-126, 1 tab, 1 fig, 1 ref.

Descriptors: Metals, *Annelids, *Copper, *Zinc, *Pathology, Benthos, Marine benthos, *Larvae, *Larval growth states, *Heavy metals, Lethal limit.
Identifiers: *Marine polychaetes, Capitella capitata, Sublethal effects, Fatal abnormalities, Polychaete larvae, Abnormal larvae.

A little known observation that exposure to sublethal concentrations of detergent cause fatal abnormalities in the second generation of a polychaete has been followed up and similar abnormalities have been observed in the first or second generation of larvae exposed to sublethal concentrations of copper and zinc. Few toxicity tests extend beyond the responses of the exposed individuals. The discovery of a delayed reaction to sublethal concentrations of common contaminants of the sea has unknown but potentially important ecological implications. (Katz)
W76-11726

SEABIRD MORTALITY IN THE NORTH IRISH SEA AND FIRTH OF CLYDE EARLY IN 1974,
Royal Society for the Protection of Birds, Sandy (England).
C. Lloyd, J. A. Bogan, W. R. P. Bourne, P. Dawson, and J. L. F. Parslow.
Marine Pollution Bulletin, Vol. 5 No. 9, 1974, p 136-140, 1 fig, 5 tab, 8 ref.

Descriptors: *Organochlorine pesticides, *Mortality, *Birds, *Oil pollution, Oily water, *Oil spills, Pathology, Non-game birds, Polychlorinated biphenyls, Dieldrin, DDE, Toxicity.
Identifiers: Tissue analysis, Guillemots, Cormorant, Shags, Gulls, Terns, Auks, *Sea birds, *Irish Sea, *Firth of Clyde.

Heavy mortality of guillemots in the Irish Sea was recorded in 1969 and was the subject of a detailed enquiry. Organochlorine contamination was thought to be a contributory factor, although this could not be conclusively established. These persistent pollutants remain in the environment and further mortalities might be expected if they were indeed responsible. In January, 1974, there was a further heavy loss of seabirds in the area and, this time, investigators were prepared and the incident was carefully monitored. (Katz)
W76-11727

ECOLOGY OF PLANKTONIC INFUSORIA OF SECONDARY-OLIGOTROPHIC LAKE, (IN RUSSIAN),
Gorkii State Univ. (USSR).
M. A. Petrova, and T. P. Smirnova.
Gidrobiol Zh. 10(3), p 25-30, 1974.

Descriptors: *Eutrophication, Lakes, *Oligotrophy, *Plankton, *Ecology, *Protozoa, Seasonal, Distribution, Vegetation, Reproduction.
Identifiers: *Infusoria reproduction, Lionotus-fasciola, Russian-SFSR, Vorticella-campanula, Vorticella-nebulifera, *Lake Svetloyar(USSR).

Investigations of protozoan plankton in the secondary-oligotrophic Lake Svetloyar (Russian SFSR, USSR) showed that it is represented by a restricted number of species. Among them only Lionotus fasciola, Vorticella nebulifera and V. campanula are abundant and account for the largest part of the Protozoa production. The distribution of Protozoa follows the course of the temperature curve; during the vegetative season their bulk is confined to the layers of epi-and metalimnion. The infusoria reproduction rate varies within 0.5-2.4 divisions a day and depends on the cell dimensions. The relation of the reproduction rate to the intensity of consumption is shown. Protozoa production in Aug. and Sept. was 11.7 and 3.1 g/m2, respectively.--Copyright 1975, Biological Abstracts, Inc.
W76-11728

THE CONCENTRATIONS OF MERCURY, CADMIUM, LEAD AND COPPER IN FISH AND SHELLFISH OF KOREA, (IN KOREAN),
Pusan Fisheries Coll. (Republic of Korea).
For primary bibliographic entry see Field 5A.
W76-11729

USE OF ANIMAL BEHAVIOR STUDIES IN WATER TOXICOLOGY, (IN RUSSIAN),
Akademiya Nauk SSSR, Tolyatti. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 5A.
W76-11731

EFFECT OF TRIETHYLTIN CHLORIDE ON THE INCORPORATION OF INORGANIC CARBON (NAHC14O3) FROM THE ENVIRONMENT INTO CARP METABOLIC PROCESSES, (IN RUSSSIAN),
Moscow State Univ. (USSR).
N. S. Stroganov, O. V. Parina, and K. F. Sorvachev.
Gidrobiol Zh. 10(5), p31-35, 1974.

Descriptors: *Chlorides, Organic compounds, *Carp, *Absorption, *Metabolism, Water pollution effects, *Carbon, Carbonates, Fish behavior, *Inhibition.
Identifiers: Carbon-14, Glycogen, Triethyltin chloride, Inorganic carbon.

Triethyltin chloride (TETC) in a concentration of 0.01, 0.1 and 1 mg/l affected absorption of inorganic carbon (NaH14CO3) by (Cyprinus carpio) from the water environment and its incorporation into the metabolic processes. With 0.001 and 0.1 mg/l concentrations of TETC no noticeable deviations in fish behavior were observed for 40 days of the experiment, but changes were observed in 14C uptake by blood, white and red muscle, liver and brain. The most noticeable changes occurred in carbohydrate metabolism of the liver and brain. TETC inhibited de novo synthesis of glycogen in all the organs under study, the inhibition being especially sharp in the brain tissue.--Copyright 1975, Biological Abstracts, Inc.
W76-11732

THE EFFECT OF PESTICIDES ON THE QUALITY OF BODIES OF WATER, (IN RUSSIAN),
Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Dept. of General Public Hygiene.
Y. Pokorni, and K. Kulikova.
Gig Sanit. 1, p 89-91, 1974.

Descriptors: *Water quality, *Pesticide toxicity, Water pollution effects, *Pesticides, Water pollution control, *Toxicity, Water quality standards, *Lethal limit, Algae, Phytoplankton, Protozoa.
Identifiers: *Czechoslovakia.

Various types of pesticides, their influence on the quality of surface waters, and water pollution prevention measures are discussed. Studies were conducted at the Prague Institute (Czechoslovakia) to determine the influence of the pesticides on water organisms (algae, protozoa, phytoplankton and laboratory fish). The sensitivity of fish to different pesticides, their influences on the taste (taste to someone eating it) of the fish, as well as their toxicity were tested. It is necessary to determine the hygienic, allowed concentrations of pesticides in surface waters, in order to be able to devise the necessary sanitary measures.--Copyright 1975, Biological Abstracts, Inc.
W76-11733

FORECASTING THE DANGER OF ORGANIC COMPOUNDS IN THE ENVIRONMENT, (IN RUSSIAN),
S. D. Zaugol'nikov, M. M. Kochanov, M. M. Loit, and A. O. Stavchanskii.
Gig Sanit. 5, p 81-86, 1974.

Descriptors: *Forecasting, *Environment, *Organic compounds, *Toxicity, *Solubility, *Volatility, Water analysis, Air pollution, Regression analysis, Atmosphere, Lethal limit.
Identifiers: Nomograms, Boiling points(Organic compounds).

An analysis of the data on 43 substances in the air of industrial rooms, 30 substances in the atmosphere of populated areas and 26 substances in bodies of water established that the danger of their effect is determined not only by their toxicity but also to a considerable extent by their volatility and solubility. A method of approximate determinaton of the degree of real danger of chemical compounds was developed which is based on the dependence of the index of the degree of real danger on the boiling point of the substance and maximum allowable concentration, expressed as linear equations of multiple regression for industrial rooms, atmosphere of populated areas and bodies of water. For convenient practical use of the method, a nomogram is given by means of which the degree of real danger of a substance can be determined approximately if the boiling point of the substance and the maximum allowable concentration in the pertinent environment are known.--Copyright 1975, Biological Abstracts, Inc.
W76-11734

THE IMPORTANCE OF ZOOPLANKTON IN THE METABOLISM OF LAKE SCHIEREN, (IN GERMAN),
K. E. Nowak.
Arch Hydrobiol. 75(2), p 149-224, 1975.

Descriptors: *Zooplankton, Lakes, Europe, Algae, *Metabolism, Bacteria, Cycling nutrients, Minerology, Eutrophication, Seasonal, Phytoplankton.
Identifiers: *Lake Schieren(W Germany).

In the euproductive Schierensee (West Germany) zooplankton plays a decisive role in the breakdown and direct utilization of living algae, bacteria and zooplankton. The contribution of zooplankton to direct and indirect mineralization processes and recycling of nutrients makes it the driving force in the rapid metabolism of this particular lake. The typical clear water stage that occurs in many lakes in June is caused to some extent by lack of phosphate and other nutrients but also by the high bioactivity of zooplankton. In spring and early summer this bioactivity is nearly double that in autumn; this is due to poor utilization of the algae which dominate in autumn. In spring the assimilation of organic substances, mainly organisms, reaches a peak of 70-90% of the rate of primary production, and 50-60% only in autumn. Evidently there is a close correlation between quality and quantity of phytoplankton and the development and bioactivity of zooplankton.--Copyright 1975, Biological Abstracts, Inc.
W76-11735

INTERACTION OF BLUE-GREEN ALGAE WITH MULTIPLY-CHARGED INORGANIC CATIONS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. of Colloidal Chemistry and Water.
For primary bibliographic entry see Field 5A.
W76-11736

CHARACTERISTICS AND PRODUCTION POTENTIALS OF ZOOPLANKTON FROM LAKE SHCHELKUN IN THE MIDDLE URALS, (IN RUSSIAN),
Ural and Siberian Fishery Scientific-Research and Planning Inst., Sverdlovsk (USSR).
I. V. Kozlova.
Gidrobiol Zh. 10(3), p 31-38, 1974.

Descriptors: *Zooplankton, Lakes, *Biomass, Vegetation, Ice, *Productivity.
Identifiers: *Bosmina-Longirostris, Russian-SFSR, Urals, *Lake Shchelkun(USSR).

Zooplankton development dynamics in Lake Shchelkun (Russian SFSR, USSR) and its connections with the hydrometrological conditions and elevation in the water level are given for the period from Feb., 1969-Feb., 1972. The main zooplankton complex remains constant in spite of the total biomass fluctuations within wide limits (0.56-6.23 g/m3 in the vegetation period, 0.001-0.22 g/m3-under ice). Data are presented on the biology of some mass zooplankton species. The bulk of production of foor zooplankton in the vegetation period of 1971 was formed in Aug.-Sept., when Bosmina longirostris dominated the plankton.--Copyright 1975, Biological Abstracts, Inc.
W76-11737

THE LAKE TEXCOCO (MEXICO) SEDIMENTS AND THEIR CAPACITY TO SUPPORT VEGETATION, (IN FRENCH),
Toulouse-3 Univ. (France).
For primary bibliographic entry see Field 2J.
W76-11738

PHYTOPLANKTON, PRODUCTION AND BREAKDOWN OF ORGANIC MATTER IN THE KUIBYSHEV RESERVOIR, (IN RUSSIAN),
Akademiya Nauk SSSR, Tolyatti. Institut Biologii Vnutrennykh Vod.
A. B. Ivantin.
Gidrobiol Zh. 10(3), p 65-69, 1974.

Descriptors: *Phytoplankton, Productivity, *Organic matter, Reservoirs, *Decomposing organic matter, *Primary productivity, Photosynthesis.
Identifiers: Russian-SFSR, Kuibyshev Reservoir(USSR).

On the basis of observations at 14 stations in the Kuibyshev Reservoir on the Volga (Russian SFSR, USSR) between May-Oct. 1971 data are presented on mean daily production of phytoplankton, decomposition of organic matter and intensity of photosynthesis in the trophogenic layer of water. Regardless of the level of organic matter production in the reservoir, decomposition usually exceeded primary production by 2-3 times.--Copyright 1975, Biological Abstracts, Inc.
W76-11739

ON THE PROROCENTRUM RED TIDE OCCURRED IN THE COASTAL WATERS OF TOYOURA, FUNKA BAY, HOKKAIDO, IN SEPTEMBER, 1973, (IN JAPANESE),
A. Iizuka, and S. Komaki.
Bull Hokkaido Reg Fish Res Lab. 40, p 60-66, 1974.

Descriptors: *Red Tide, Plankton, *Dinoflagellates, Bays, Metabolism, Dissolved oxygen, Salinity, Water pollution effects.
Identifiers: Coastal waters, Halocline, Hokkaido, *Japan(Funka Bay), *Prorocentrum, Prorocentrum-micans, Scallop, Toyoura.

Prorocentrum, Dinoflagellata has often occurred as red tide plankton in polluted inland waters of Honshu, but in Hokkaido (Japan) the red tide species was rarely seen until 1972. In Sept. 1973 the 1st occurrence of the red tide, composed of the monotonic species, P. micans Ehrenberg, was observed in the coastal waters of Toyoura and its adjacent area, Funka Bay, Hokkaido. In coastal waters with a depth of 15-20 m, the surface water to about 0.5 m had a low salinity of 25.06-29.59%, and at the greater depths, 30.00-33.67%, therefore a sharp halocline was found between 0.5-1 m. Near the red tide, dissolved O2(DO) reaches 160-168%, and chemical O2 demand (COD) of dissolved matter reaches 2.6-5.8 mg/l. The increase in DO COD in the sea water seemed to be caused by active metabolism of the red tide species. Damage of the scallop cultivated in this area was not found in spits of the relatively long duration of the red tide.--Copyright 1975, Biological Abstracts, Inc.
W76-11740

NITROGEN CYCLING IN MICROCOSMS AND APPLICATION TO THE BIOLOGY OF THE NORTHERN ARM OF THE GREAT SALT LAKE,
Utah State University, Logan. Dept of Biology.
J. C. Stube, J. Post, and D. B. Porcella.
Available from the National Technical Information Service, Springfield Va 22161, as PB-257 063, $5.00 in paper copy, $3.00 in microfiche. Utah Water Research Laboratory Logan, Publication PRJSBA-016-1, 77 p, June 1976. 43 fig, 28 tab, 111 ref, 3 append. OWRT A-024-UTAH(2), 14-34-0001-6046.

Descriptors: *Nitrogen compound, *Nitrogen cycle, Water pollution sources, Water pollution, Waste water(Pollution), *Halophilic animals, *Halophytes, Algae, Denitrification, *Utah, *Saline, lake, Organic matter, Brine shrimp, Nitrgen fixation, Nitrate, Nitrites, Bacteria, Ammonia, Nutrients, *Cycling nutrients.
Identifiers: *Great Salt Lake(Utah), Halobacterium, Halococcus, Dunaliella salina, D. viridis, Artemia salina, Ephydra gracilis, E. Hians, Brine fly.

Nitrogen cycling was studied in the hypersaline north arm of the Great Salt Lake. The lake, particularly the north arm, has a massive accumulation of organic matter from at least 10 cycles in the last 100,000 years from a freshwater to a saline lake, plus the influence of human industry and agriculture in more recent times. The north arm planktonic and attached community consists of principally, in order of biomass: bacteria of at least two genera, Halobacterium and Halococcus; two algae, Dunaliella salina and D. viridis; the brine shrimp, Artemia salina; and, two species of brine fly, Ephydra gracilis and E. hians an possibly one more species. The nitrogen cycle was studied using weekly lake samples and sediment-water microcosms. Result from the lake samples indicated a high level of organic nitrogen as well as undetectable amounts of nitrate, nitrite, and nitrogen fixation. Ammonia was the only detectable inorganic nitrogen form and occured in the lake only at times of low algal activity or high excretion rates by the invertebrates or high bacterial activity. Microcosm studies demonstrated that ammonia, nitrate and urea did not stimulate the bacteria directly but did so indirectly through increased algal activity. Glutamic acid, an organic form of nitrogen, stimulated the bacteria directly. No nitrification was observed in the microcosms although nitrate is observed when the microcosms were fed nitrate (denitrification). A preliminary model of various interaction is presented and some aspects of the various organisms and their metabolism are discussed.
W76-11778

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA. PART III. THERMAL TOLERANCE AND SEDIMENT TOXICITY STUDIES,
University of Southern California, Los Angeles. Allan Hancock Foundation.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-74-11120, $5.50 in paper copy, $3.00 in microfiche. Southern California University Sea Grant Program, Report USC-SG-1-74, February 1974, 110 p. D. F. Soule and M. Oguri (Eds.). SG-04-3-158-45.

Descriptors: Aquatic animals, *Benthos, *Toxicity, *Sediments, Survival, Reproduction, Annelida, Mollusca, Gastropoda, Harbors, Upwelling, Ocean currents, Intertidal zones, *California, *Thermal pollution, Water temperature, Mexico, *Marine animals, Bays.
Identifiers: *San Pedro Bay(Calif), *Dredge spoil, Los Angeles Harbor(Calif), Polychaetes, Engraulis mordax, Anchovy, Capitella capitata, Neanthes arenaceodentata, Littorina planaxis, Littorina scutulata, LNG conversion plant, Baja California, Current patterns, Cold water effluents.

This is the third in a series of marine studies of San Pedro Bay, California. Emphasis is on thermal tolerance and sediment toxicity studies. The six studies are titled: Thermal effects and San Pedro Bay, D. F. Soule; Preliminary observations on the lower minimum temperature requirements of the Northern Anchovy, G. Brewer; Effects of subnormal temperatures on some common Los Angeles Harbor animals, E. A. Norse; The effect of various water temperatures on the survival and reproduction in polychaetous annelids: Preliminary Report, P. Oshida and D. J. Reish; Tolerance of Littorina planaxis and L. scutulata to temperature changes (Mollusca, Gastropoda), D. Hadley and D. Straughan; and, Preliminary investigations of the effects of resuspended sediment on two species of benthic polychaetes from Los Angeles Harbor, R. R. Emerson. (See also W74-05708; W75-04272; W75-03176; and W75-06245) (See W76-11794 thru W76-11799) (NOAA)
W76-11793

THERMAL EFFECTS AND SAN PEDRO BAY,
University of Southern California, Los Angeles. Allan Hancock Foundation.
D. F. Soule.
In: Marine Studies of San Pedro Bay, California. Part III. Thermal Tolerance and Sediment Toxicity Studies. University of Southern California, Los Angeles. USC-SG-1-74, p 1-20, 6 fig, 40 ref. February, 1974.

Descriptors: *California, *Marine animals, *Cooling water, *Water currents, *Water temperature, *Thermal pollution, Industrial wastes, Thermal stress, Aquatic environment, Biota, Methodology, Reviews.
Identifiers: *Cool water, *Cool temperate biota, *San Pedro Bay(Calif), Liquid natural gas conversion plant, *Thermal tolerance, Low temperature extremes, Los Angeles Harbor(Calif), Cold water effluents.

A summary of thermal effects research is presented in relationship to local considerations of a proposed cold water effluent from a liquid natural gas conversion plant. Criteria for evaluating effects are discussed. Local, regional, and Pacific west coast current patterns and thermal regimes are compared, and the potential for recolonization by cool-temperate biota is examined. The proposed cold water effluent might mimic areas of up-welling along the coast of southern and Baja California, where such biota have been recorded. (See also W76-11793) (Katz)
W76-11794

PRELIMINARY OBSERVATIONS ON THE LOWER MINIMUM TEMPERATURE REQUIREMENTS OF THE NORTHERN ANCHOVY,
University of Southern California, Los Angeles. Allan Hancock Foundation.
G. Brewer.
In: Marine Studies of San Pedro Bay, California, Part III. Thermal Tolerance and Sediment Toxicity Studies, University of Southern California, Los Angeles. USC-SG-1-74, February, 1974. p 21-43, 3 tab, 3 fig, 28 ref.

Descriptors: *Marine fish, *Marine animals, *Cooling water, *Biota, *Fish behavior, *Bioassay, *Fish eggs, Industrial effluents, Thermal stress, Aquatic environment, Methodology, Water temperature, Cold-water fish, Fish reproduction, *Thermal pollution, California.
Identifiers: *Temperature selection, *Temperature tolerance, Lower minimum temperature requirements, *Northern anchovy, Engraulis mordax, Los Angeles Harbor, Anchovy eggs, Juvenile anchovies, Temperature preference, Temperature avoidance.

A study of the lower minimum temperature requirements of the northern anchovy, Engraulis mordax, was made. Juvenile anchovies held for a minimum of two weeks at acclimation temperatures of 19.5 degrees, 16.0 degrees, and 12.0 degrees were subjected to various degrees of thermal stress from 17.0 degrees to 7.0C. A lower lethal temperature of approximately 7.0C was estimated from two experimental procedures. Anchovy eggs were held at incubation temperatures between 9.0 degrees and 15.0C. At incubation temperatures below 10.0C, complete yolk absorption and starvation occurred in larvae before development of pigmented eyes and a functional jaw was completed. Behavior of juvenile anchovies in a 2.3 m horizontal thermal gradient with a temperature differential of 5.0C indicated significant selection of the warmest water available to the fish at experimental temperatures between 13.0 degrees and 25.0C. Anchovies actively avoided temperatures above 25.0C. (See also W76-11793) (Katz)
W76-11795

EFFECTS OF SUB-NORMAL TEMPERATURES ON SOME COMMON LOS ANGELES HARBOR ANIMALS,
University of Southern California, Los Angeles. Allan Hancock Foundation.
E. A. Norse.
In: Marine Studies of San Pedro Bay, California, Part III. Thermal Tolerance and Sediment Toxicity Studies, University of Southern California, Los Angeles. USC-SG-1-74, February, 1974. p 44-62, 3 tab, 1 fig, 16 ref.

Descriptors: Invertebrates, *Mollusks, *Mussels, *Crustaceans, *Crabs, Benthic fauna, Marine fish, *Bioassay, Cooling water, Methodology, *Water temperature, Physiology, Reproduction, Breeding, Sexual maturity, Harbors, *Mortality, *Thermal pollution, California.
Identifiers: *Coelenterates, *Arthropods, *Mytilus edulis, Pachygrapsus, Tisbe, Cladonema, Zoeal larvae, Medusae, Copepodite, Temperature tolerance, Lower minimum temperature, Sublethal effects, Swimming ability, Byssus thread formation, Reproductive rates, Subnormal temperatures, *Los Angeles Harbor(Calif).

Four species of animals belonging to three phyla (Coelenterata, Mollusca and Arthropoda) were tested to demonstrate effects of lowered temperatures. Adult Mytilus edulis and zoeal larvae of Pachygrapsus crassipes were acclimated at 21C; medusae of Cladonema sp. were acclimated at 17C, and adult and late copepodite stages of Tisbe sp. were acclimated at 21, 17, 13, and 9C. Animals were then transferred to 21, 17, 13, 9, or 5C for 24 hours. Significant mortalities occurred in 19.2% of Tisbe sp. acclimated at 21C, and 100.0% of Cladonema sp. acclimated at 17C died when transferred to 5C. (See also W76-11793) (Katz)
W76-11796

THE EFFECT OF VARIOUS WATER TEMPERATURES ON THE SURVIVAL AND REPRODUCTION IN POLYCHAETOUS ANNELIDS: PRELIMINARY REPORT,
California State Univ., Long Beach. Dept. of Biology.
P. Oshida, and D. J. Reish.
In: Marine Studies of San Pedro Bay, California, Part III. Thermal Tolerance and Sediment Toxicity Studies, University of Southern California, Los Angeles. USC-SG-1-74, February, 1974. p 63-77, 3 tab, 24 ref.

Descriptors: Water quality, *Bioassay, *Benthic organisms, Benthos, *Mortality, *Water temperature, Marine animals, Laboratory study, Aquatic environment, Thermal stress, Reproduction, Feeding rates, *Annelids, Cooling water, *Thermal pollution, California.
Identifiers: *Polychaetous annelids, Capitella capitata, Neanthes arenaceodentata, Minimum temperature, Maximum temperature.

The effects of varying water temperatures, namely 5, 9, 13, 17, 23, 26, 29, 32, and 35C, on survival, feeding, and reproduction were studied on three laboratory inbred species of polychaetous annelids. Laboratory procedures were outlined for both short term and long term experiments; the preliminary data were presented for Capitella capitata and Neanthes arenaceodentata. The maximum and minimum 28 day TLm values were 7.8 and 26.6C for Capitella capitata and 12.3 and 24.6C for Neanthes arenaceodentata. (See also W76-11793) (Katz)
W76-11797

TOLERANCE OF LITTORINA PLANAXIS AND LITTORINA SCUTULATA TO TEMPERATURE CHANGES,
University of Southern California, Los Angeles. Allan Hancock Foundation.
D. Hadley, and D. Straughan.
In: Marine Studies of San Pedro Bay, California, Part III. Thermal Tolerance and Sediment Toxicity Studies, University of Southern California, Los Angeles. USC-SG-1-74, February, 1974. p 78-96, 9 tab, 5 ref.

Descriptors: *Bioassay, *Thermal stress, Behavior, Benthic organisms, Benthos, Mollusks, Gastropods, *Water temperature, Intertidal areas, Thermal pollution, *Snails, Growth rates, California.
Identifiers: *Intertidal snails, Littorina, Attachment rate, Oxygen consumption.

This survey was conducted primarily to consider the effects of reduced water temperature on two intertidal snails, Littorina planaxis and L. scutulata. The parameters considered included mortality, attachment of animals to the substrate, size of animals, and season of the year. Additional experiments were conducted on elevated temperatures to consider whether the animals respond merely to temperature change itself, or whether the direction of temperature change is important. Within the range of 6C to 29C the response appears to be seasonal and size dependent in L. planaxis. Littorina scutulata is more tolerant of 6C than 29C. No mortality was recorded at 6C while mortality was recorded in both species at 29C. The rate of attachment was influenced by temperature in both species. This is important, because unattached animals are readily washed away from the population. Littorina scutulata had a higher attachment rate than L. planaxis at 6C. When both species are subjected to a 12C drop in temperature, there is often a short period when attachment rate is low so that the intermittent exposure to such changes could result in a gradual loss of animals through wave action during such periods. (See also W76-11793) (Katz)
W76-11798

PRELIMINARY INVESTIGATIONS OF THE EFFECTS OF RESUSPENDED SEDIMENT ON TWO SPECIES OF BENTHIC POLYCHAETES FROM LOS ANGELES, HARBOR,
University of Southern California, Los Angeles. Allan Hancock Foundation.
R. R. Emerson.
In: Marine Studies of San Pedro Bay, California, Part III. Thermal Tolerance and Sediment Toxicity Studies, University of Southern California, Los Angeles. USC-SG-1-74, February, 1974, pp 97-110, 2 tab, 3 fig, 5 ref.

Descriptors: *Annelids, *Toxicity, *Mortality, *Bioassay, Laboratory animals, *Reproduction, *Productivity, Biota, Laboratory studies, *Sediments, Spoil banks, Benthos, *Suspended solids, Harbors, California.
Identifiers: *Polychaetes, *Toxic elutriates, Capitella capitata, Larvae, Trochophores, Metatrochs, Ophryotrocha, Resuspended sediments, Sea fertilizer, *Los Angeles Harbor(Calif).

Ophryotrocha nr. labronica and Capitella capitata were used as bioassay organisms to determine the toxicity of resuspended sediment from Los Angeles Harbor. Sediment was collected from four stations representing a range of polluted conditions. A test solution or 'standard elutriate' was prepared according to EPA guidelines. An additional series of dilutions and concentrations were prepared to produce a range of toxic elutriates. Mortality of Capitella capitata trochophores and metatrochs was less than 50% in all short term 96 hour exposures. Long term (28 day) exposures were unsuccessful. Ophryotrocha did not undergo any mortality during a short term 96 hour exposure. Long term (28 day) exposure decreased reproductivity at high concentrations of resuspended sediment. Lower concentrations of resuspended sediment produced a stimulatory effect on reproduction. Preliminary evidence suggests that harbor dredge spoils may have potential role as a 'sea fertilizer' which could be distributed in specified areas to improve the productivity of the marine environment. (See also W76-11793) (Katz)
W76-11799

EVALUATION OF STREAM CHANNELIZATION AND MITIGATION ON THE FISHERY RESOURCES OF THE ST. REGIS RIVER, MONTANA,
Montana Cooperative Fishery Unit, Bozeman.
For primary bibliographic entry see Field 4C.
W76-11800

CAESIUM-137: ITS ACCUMULATION IN A LITTORAL COMMUNITY,
University of Manchester Inst. of Science and Technology (England). Pollution Research Unit.
M. J. Broom, P. D. Grimwood, and E. G. Bellinger.
Marine Pollution Bulletin, Vol. 6(2), 1975, p. 24-26, 2 tab., 1 fig., 21 ref.

Descriptors: *Cesium, *Radioactive waste disposal, *Demersal fish, *Commercial fish, *Marine fish, *Mussels, *Marine algae, Radioactive wastes, Radioecology, Radioisotopes, Marine animals, Mollusks, Aquatic plants, *Littoral, *Putassium, Path of pollutants, Water pollution effects.
Identifiers: *Windscale, *Caesium-137, *Irish Sea.

The low-level radioactive liquid wastes which arise at the U. K. nuclear fuel reprocessing plant at Windscale on the Cumbria coast are discharged into the Irish Sea. These wastes are initially dispersed but they can also become reconcentrated in marine organisms. Concentrations of 137-Cs relative to those of potassium in the various stages of marine food chains are described, discrimination occurs in favor of 137-Cs over potassium during the transfer between the different trophic levels. (Katz)
W76-11808

FIN EROSION IN WINTER FLOUNDER,
National Marine Fisheries Service, Highlands, N. J. Sandy Hook Sport Fisheries Marine Lab.
J. Ziskowski, and R. Murchellano.
Marine Pollution Bulletin, Vol. 6(2), 1975, p. 26-29, 1 tab, 3 fig, 9 ref.

Descriptors: *Marine fish, *Atlantic Ocean, *Fish diseases, Animal pathology, *Bottom fish, *Demersol fish, Commercial fish, Environmental effects, Fish physiology, Fish populations, *Epizootiology, Estuarine environment, Bays, On-site investigations, *New Jersey, Bays, Water pollution effects.
Identifiers: *New York Bight, *Great Bay(NJ), *Sandy Hook-Raritan Bay(NJ), *Fin erosion, *Winter flounders.

Diseased fish showing erosion of the fins have been recorded from polluted waters in several parts of the world. Results of a year's survey of fin erosion among fish in oceanic and estuarine waters of New York Bight are presented. The pristine Great Bay was chosen as a control for the heavily contaminated Sandy Hook-Raritan Bay system. Almost all fin erosion was confined to demersal flat fish, particularly the winter flounder, a species which spends a long time in polluted estuaries near Sandy Hook. (Katz)
W76-11809

INCIDENCE OF POLYCHLORINATED BIPHENYLS IN CLYDE SEAWEED,
Leeds Univ. (England). Wellcome Marine Lab.
J. G. Parker, and F. Wilson.
Marine Pollution Bulletin, Vol. 6(3), 1975, p. 46-47, 1 tab., 1 fig., 14 ref.

Descriptors: *Polychlorinated biphenyls, *Chlorinated hydrocarbon pesticides, *Aquatic plants, Storage, Water pollution effects, *Marine algae, *Kelp, Rooted aquatic plants.
Identifiers: *Seaweed, *Firth of Clyde, Clyde estuary, Pelvetia, Fucus, Ascophylla.

PCBs accumulate in seaweeds. This survey of concentrations found in fixed algae around the Firth of Clyde reveals a similar pattern of PCB distribution to that found in mussels. (Katz)
W76-11810

EUTROPHICATION OF A PARTIALLY ENCLOSED ESTUARINE MUDFLAT,
National Inst. for Physical Planning and Construction Research, Dublin (Ireland).
E. Fahy, R. Goodwillie, J. Rochford, and D. Kelley.
Marine Pollution Bulletin, Vol. 6(2), 1975, p 29-31, 3 fig, 13 ref.

Descriptors: *Estuarine environment, *Bays, *Waterfowl, *Eutrophication, *Nutrients, *Tidal marshes, Intertidal areas, Water birds, Wildlife, Water pollution effects, Nitrogen, Phosphorous, Potassium, Distribution.
Identifiers: *Spartina, Biological mapping, *Dublin, *Ireland, *Rogerstown estuary(Ireland).

Some 130 years ago, a small estuary to the north of Dublin was partly cut off from the sea by a railway causeway. The mudflats that formed became an important feeding ground for wildfowl. In recent years the estuary has become subject to increasing organic pollution. Algal growth has increased and while the situation is not yet damaging to wildfowl, there is evidence that further increase in nutrients would cause undesirable extension of algal mats in the estuary. (Katz)
W76-11811

EFFECTS OF CRUDE OIL ON CORALS,
Pennsylvania State Univ., University Park.
A. A. Reimer.
Marine Pollution Bulletin, Vol. 6(3), 1975, p 39-43, 3 tab, 3 fig, 14 ref.

Descriptors: Oil, *Oil pollution, *Coral, *Reefs, *Toxicity, *Bioassays, Behavior, Animal behavior, Invertebrates, Atolls, Tropical regions, Aquatic habitat, Environmental effects, Mortality, Food habits, Water pollution effects.
Identifiers: *Reef communities, *Crude oil, Reef metabolism, Panamanian coral species, Crude oil, Bunker-C oil, Marine diesel oil, *Feeding response.

Corals are key members of the tropical reef communities, by providing habitat for other organisms and entering importantly into the overall metabolism of the reef community. Concern has been expressed several times at the collapse of the community that would result from damage to corals by oil pollution. So far relatively few experimental studies of the susceptibility of coral to oil have been carried out. In this study four Panamanian coral species have been exposed to marine diesel and bunker oil. These may cause delayed death, but probably more importantly interfere with feeding and metabolism at sub-lethal concentrations. (Katz)
W76-11812

AROMATIC HYDROCARBONS AND THE GROWTH OF MARINE ALGAE,
Glasgow Univ. (Scotland). Dept. of Botany.
A. D. Boney.
Marine Pollution Bulletin, Vol. 5, (12), 1974, p 185-186, 3 tab, 5 ref.

Descriptors: *Mortality, *Organic compounds, *Pathology, *Plant pathology, Toxicity, *Marine algae, *Marine sediments, Water pollution effects, *Aromatic compounds.
Identifiers: *Aromatic hydrocarbons, *Cancerous growths, *3,4-benzpyrene, *20-Methyl cholanthrene, *Carcinogens, *Carcinogenic activity, Tumor-like proliferations.

Aromatic compounds isolated from marine muds cause cancerous growths in certain seaweeds. In this study a number of aromatic hydrocarbons, including some which are not yet reported as having carcinogenic activity have been found to stimulate growth of algae. (Katz)
W76-11813

EFFECTS OF PETROLEUM ON ESTUARINE BACTERIA,
Maryland Univ., College Park. Dept. of Microbiology.
J. D. Walker, P. A. Seesman, and R. R. Colwell.
Marine Pollution Bulletin, Vol. 5(12), 1974, p 186-188, 1 tab, 3 fig, 6 ref.

Descriptors: *Oil pollution, *Estuaries, Aquatic microorganisms, *Marine bacteria, *Marine fungi, *Marine algae, *Chesapeake Bay, Oil spills, Estuarine environment, Growth rates, Marshes.
Identifiers: *Filamentous fungi, *Achlorophyllous algae, *Proteolytic bacteria, *Lipolytic bacteria, Fuel oil no 2, Louisiana crude oil, *Chitinolytic bacteria.

The effects of petroleum on the natural microbial flora of a given environment, that is, on the bacteria, yeasts, filamentous fungi, and achlorophyllous algae, have largely been ignored. The first recorded investigation of the impact of petroleum on ecologically important groups of bacteria is presented. (Katz)
W76-11814

INTERTIDAL ORGANISMS OF AN INDUSTRIALIZED ESTUARY,
Paisley Coll. of Technology (Scotland). Dept. of Biology.
J. C. Smyth, D. J. Curtis, I. Gibson, and M. Wilkinson.
Marine Pollution Bulletin, Vol. 5(12), 1974, p 189-191, 1 tab, 4 fig, 13 ref.

Descriptors: *Estuaries, *Estuarine environment, *Beaches, *Mudflats, *Wading birds, Water pollution effects, *Annelids, *Oligochaetes, *Molluscs, *Crustaceans, Intertidal areas, Shores, Terrestrial habitat, *Aquatic birds, Wildlife, Ducks(Wild), Marine plants.
Identifiers: *Glasgow, Firth of Clyde, Redshank, Black Headed Gulls, *Clyde estuary, *Bird feeding areas.

A study of the intertidal organisms of the Clyde Estuary is being undertaken to assess the effects of changing levels of pollution and to relate to these and other changes the distribution of important winter flocks of waders and ducks. (Katz)
W76-11815

DIFFERENTIAL SENSITIVITY TO PCB BY PHYTOPLANKTON,
Florida State Univ., Tallahassee. Marine Lab.

S. A. Moore, Jr., and R. C. Harriss.
Marine Pollution Bulletin, Vol. 5(11), 1974, p 174-176, 12 ref.

Descriptors: *Polychlorinated biphenyls, *Toxicity, *Nannoplankton, *Estuarine environment, *Phytoplankton, Mortality, Bioassay, Aquatic algae, Aquatic plants, Aquatic productivity, Marine plants, Primary productivity, Water pollution effects.
Identifiers: Differential sensitivity, Aroclor 1242.

Natural, mixed phytoplankton communities are more sensitive to PCBs than pure or mixed laboratory cultures. Further, nannoplankton is generally omitted from consideration although this fraction contributes the bulk of production by the phytoplankton community. This study is the first attempt to evaluate the differential sensitivity to PCB by an estuarine phytoplankton community. Contrary to expectation, the greatest sensitivity to PCB is found in net-plankton not in nannoplankton. The susceptibility of phytoplankton to PCBs is highly variable within a community and this may have important implications for selective plankton feeders. (Katz)
W76-11816

POLLUTION OF HONG KONG'S COMMERCIAL OYSTER BEDS,
Hong Kong Univ. Dept. of Zoology.
B. Morton.
Marine Pollution Bulletin, Vol. 6(8), 1975, p. 117-121, 3 tab, 3 fig, 17 ref.

Descriptors: *Aquiculture, *Oysters, *Commercial shellfish, *Public health, *Coliforms, Water pollution effects, Sewage bacteria, Water quality, Water pollution sources.
Identifiers: *Crassostrea gigas, Deep bay oyster industry, *Hong Kong, *Commercial oyster beds, Oyster purification.

Oysters are cultivated in Hong Kong by a primitive method of bottom laying in polluted waters. The method of shucking the oysters is also unhygienic. The oysters are faecally contaminated, particularly in the summer months when the rain-bearing south-east monsoon flushes out the rivers, streams and watercourses (drains) into the oyster producing areas. The level of contamination is high and largely comprises effluents derived from the neighboring agricultural areas of Hong Kong and southern China. Cleansing of the oysters, prior to resale, particularly in summer, is urgently recommended, possibly using ultraviolet light as a necessary exercise in public health. But an ultimate solution to the problem lies in the longer term modernization of the industry. (Katz)
W76-11817

INTERTIDAL FAUNA OF THE INDUSTRIALIZED FORTH ESTUARY,
Stirling Univ. (Scotland). Dept. of Biology.
D. McLusky, D. Bryant, M. Elliott, M. Teare, and G. Moffot.
Marine Pollution Bulletin, Vol. 7(3), 1976, p. 48-51, 7 fig, 10 ref.

Descriptors: *Beaches, *Estuaries, *Mudflats, Industrial effluents, Domestic effluents, *Water birds, *Clams, *Annelids, *Oligochaetes, Intertidal areas, Aquatic habitats, Invertebrates, Benthic organics, Wading birds, Waterfowl, Mollusks, Mussels, Water pollution effects.
Identifiers: *Firth of Forth, Hydrobia, Macoma balthica, Nereis diversicola, Nephthys hombergi, Arenicola marina, Mytilus edulis, Mya.

The estuarine Firth of Forth on the East Coast of Scotland receives a considerable volume of industrial and domestic effluent. The status of intertidal invertebrates and their bird predators is described. (Katz)
W76-11818

POLYSTYRENE SPHERULES IN THE SEVERN ESTUARY-A PROGRESS REPORT,
Bath Univ. (England). School of Biological Sciences.
For primary bibliographic entry see Field 5B.
W76-11819

INFLUENCE OF OIL ON NUCLEIC ACIDS OF ALGAE,
Institute of Biology of the Southern Seas, Sevastopol (USSR).
I. A. Daravin, O. G. Mironov, and I. M. Tsimbal.
Marine Pollution Bulletin, Vol 6(1), 1975, p. 13-14, 6 tab., 10 ref.

Descriptors: *Oil pollution, *Oily water, *Oil spills, *Algae, Biochemistry, *Enzymes, *Metabolism, Energy conversion, Plant physiology, Plant growth, Regulations, Environmental effects, Plant pathology, Toxicity.
Identifiers: *Black Sea, *Petroleum hydrocarbons, Sub-lethal effects, DNA, RNA, Nucleic acids.

There is a fair amount of knowledge on the grosser effects of petroleum hydrocarbons on organisms, more subtle effects are still poorly known. This is particularly true of their influence on biologically active compounds. Studies on the effect of oil on DNA and RNA of some Black Sea algae suggest that it inhibits biosynthesis of these compounds and modifies the degree of polymerization of deoxyribonucleic acids. (Katz)
W76-11821

ELIMINATION OF HYDROCARBONS BY MUSSELS,
Instituto di Biologia del Mare, Venice (Italy).
V. U. Fossato.
Marine Pollution Bulletin, Vol. 6(1), 1975, p. 7-10, 1 tab., 2 fig., 17 ref.

Descriptors: *Oil pollution, *Oil spills, *Oily water, *Mussels, Biochemistry, *Degradation, Mollusks, Mytilus, Water pollution effects, Pathology, Environmental effects, Metabolism, Mode of action, Temperature.
Identifiers: *Hydrocarbon elimination, *Lagoon of Venice(Italy), Biological half-life, Aliphatic hydrocarbons, Mytilus galloprovincialis.

Mussels collected from hydrocarbon polluted areas of the Lagoon of Venice were transferred to the relatively unpolluted port entrance of Malamocco. Hydrocarbon elimination was quite rapid in the first 10-15 days but then slow and incomplete: 12% of the initial content persisted in the tissues for 8 weeks. Elimination of hydrocarbons was almost independent of water temperature between 7.5-26.00C but virtually ceased in one lot when the temperature abruptly dropped from about 11C to 4.5-6.0C. The biological half-life of hydrocarbons in the mussels was calculated to be a little over 3-1/2 days, but this relates only to the initial rapid phase of elimination. (Katz)
W76-11822

TEMPERATURE AND THE SEASONAL AND GEOGRAPHICAL OCCURRENCE OF OILED BIRDS ON WEST EUROPEAN BEACHES,
Aberdeen Univ. (Scotland). Seabird Group.
W. R. P. Bourne, and C. J. Bibby.
Marine Pollution Bulletin, Vol. 6(5), 1975, p. 77-80, 2 tab., 2 fig., 54 ref.

Descriptors: Environmental effects, *Mortality, *Oil-water interface, *Shore birds, *Aicides, *Seashores, *Coasts, Oil pollution, Oily water, Oil spills, Mortality, Water pollution effects, Non-game birds, Water birds, Gulls, Waterfowl, Wildlife, *Water temperature, Atlantic Ocean, Mediterranean Sea, *Seasonal.
Identifiers: *Oiled birds, Cold water temperatures, Tar balls, Solid residues, *Beached bird surveys.

Oiled birds appear to be a commoner aspect of oil pollution where it occurs with cold water temperatures, whereas the formation of tar-balls becomes more prominent with warm ones, possibly because liquid oil becomes reduced to inert solid residue comparatively harmless to birds more rapidly at higher temperatures. (Katz)
W76-11823

EFFECTIVENESS AND TOXICITY OF AN OIL DISPERSANT IN LARGE OUTDOOR SALT WATER TANKS,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia).
P. G. Wells, and P. D. Keizer.
Marine Pollution Bulletin, Vol. 6(10): 1975, p. 153-157, 3 tab., 2 fig., 18 ref.

Descriptors: *Oil spills, *Toxicity, *Bioassays, *Methodology, *Benthos, *Weathering, *Aging(Physical), Behavior, Oil pollution, Laboratory methods, Water pollution effects.
Identifiers: *Oil dispersant, *Oilsperse 43, *Venezuelan crude oil, *Green sea urchins, Weathered crude oil.

Use of the dispersant, Oilsperse 43, increased the dispersion of Venezuelan Guanipa crude oil. The resulting mixture was more homogeneous and the oil slick less viscous than in the oil tank. The dispersant appeared to retard formation of the familiar 'crust' on the surface. A weathered crude oil plus dispersant mixture with an oil concentration of 250 micrograms/l was lethal to over 50% of the test organisms, green sea urchins within 4 days. No mortalities occurred among urchins exposed to the crude oil treatment. (Katz)
W76-11824

A MODEL OF PATCHINESS FOR PREY-PREDATOR PLANKTON POPULATIONS,
Liege Univ. (Belgium) Institut of Mathematique.
D. M. Dubois.
Ecological Modelling (International Journal on Ecological Modelling and Engineering and Systems Ecology), Vol. 1, No. 1, p 67-80, May 1975. 3 fig, 22 ref.

Descriptors: *Aquatic environment, *Plankton, *Ecology, Mathematical models, Advection, Simulation analysis, Equations, Systems analysis, Aquatic populations.
Identifiers: *Ecological systems, *Spatial structuration, Nonlinear model, Turbulent sea, Ecological waves, Partial differential equation, Prey-predator populations.

A nonlinear model is proposed to explain the horizontal structuration of prey-predator populations in a turbulent sea. The model is represented by a system of partial differential equations taking into account advection, due to residual currents, and eddy diffusivity. The ecological interactions are assumed to be of the Lotka-Volterra type. Starting from an initial small patch of prey-predator populations, numerical simulations show two distinct phases: (1) an 'explosive' phase corresponding to a bloom of phytoplankton and, after that, (2) a decrease of the quantity of plankton at the center of the patch leading to a ring structure. The ring propagates in increasing its radius with constant intensity and velocity. The prey behaves like an 'activator' and the predator like an 'inhibitor'. The ring is thus similar to an active wave. When two waves meet each other, the simulation shows their 'annihilation'. All these new properties of the prey-predator equations are in agreement with experimental data. Finally, the physical mechanism for initiation of patchiness is discussed. (Bell-Cornell)
W76-11878

A BOUNDARY VALUE APPROACH FOR ESTUARINE WATER QUALITY MODELLING

WITH RESULTS FOR JAMAICA BAY, NEW YORK,
Texas Univ. at Austin. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 5B.
W76-11881

SOME ASPECTS OF MODELLING THE LONG-TERM BEHAVIOUR OF AQUATIC ECOSYSTEMS,
Technical Univ. of Denmark, Lyngby. Inst. of Mathematical Statistics and Operations Research.
For primary bibliographic entry see Field 5B.
W76-11883

PLASTIC PARTICLES IN SURFACE WATERS OF THE NORTHWESTERN ATLANTIC,
National Marine Fisheries Service, Narragansett, R.I. Narragansett Lab.
For primary bibliographic entry see Field 5B.
W76-11889

THE ROLE OF BENTHIC METABOLISM IN A BOG LAKE,
Connecticut Univ., Storrs. Inst. of Water Resources.
P. H. Rich.
Available from the National Technical Information Service, Springfield, Va., 22161, as PB-257 151, $3.50 in paper copy, $3.00 in microfiche. Completion Report, July 1976. 5 p, 1 fig, 5 ref. OWRT A-054-CONN (2) 14-31-0001-4007.

Descriptors: Eutrophication, Water pollution effects, *Lakes, *Lake sediments, *Metabolism, *Detritus, *Carbon cycle, Nutrients, *Trophic level, Ecosystems, Hypolimnion, Stratification, Bogs, Ponds, Carbon dioxide, Absorption, Oxygen sag, Anaerobic conditions, Organic matter, Photosynthesis, *Connecticut.
Identifiers: *Soft-water lake, *Benthic metabolism, Trophic dynamics, *Redox gradients, *Hypolimnetic oxygen deficit, Chemosynthesis, *Bacterial photosynthesis, Nutrient regulation, Alternate electron acceptors, *Dunham Pond(Conn).

A small, New England, soft-water lake accumulates more hypolimnetic CO2 during stratification than concomitant 02 uptake. Thus, benthic anaerobic metabolism is greater than benthic oxygen uptake estimates indicate, and energy-rich metabolic intermediates (alternate electron acceptors) are produced which may undergo deferred respiration (02 uptake) far from their origin (CO2 evolution). The energy released from these deferred transformations creates redox gradients, drives chemosynthesis and subsidizes bacterial photosynthesis in the water column. Because of the light limitation imposed by dissolved organic matter entering from the watershed, benthic respiration based largely upon terrestrial inputs, also, probably subsidizes the production of particulate organic carbon in the water column of Dunham Pond to a great extent. This pathway, which is important to the higher trophic levels of the lake, probably depends, in turn, upon a series of edaphic factors somewhat different than those thought to control algal production. (de Lara-Connecticut).
W76-11906

BENTHIC METABOLISM OF A SOFT-WATER LAKE,
Connecticut University, Storrs.
P. H. Rich.
Verh. Internat. Verin. Limnol., Vol. 19, p 1023-1028, October 1975. 3 fig, 2 tab, 7 ref. OWRT A-054-CONN (1) 14-31-0001-4007.

Descriptors: *Lakes, *Lake sediments, *Stratification, *Metabolism, *Chemical oxygen demand, *Carbon dioxide, *Dissolved oxygen, Ecosystems, *Connecticut.
Identifiers: *Soft-water lake, *Respiratory quotients, *Benthic metabolism, *Redox potential, *Alternate electron acceptors, *Dunham Pond(Conn).

Empirical respiratory quotients (RQ=C02/02) were obtained for Dunham Pond, a small, soft-water lake in the eastern crystalline highlands of Connecticut, by measuring the rates at which dissolved C02 (total) accumulated and dissolved 02 disappeared in the summer hypolimnion (below 2m) and beneath the ice in the winter. The data obtained from the hypolimnion during summer stratification indicate that more 02 than expected is taken up during the early part of stratification (negative C02 anomaly) and more C02 than expected is evolved during the latter part of stratification (positive C02 anomaly). Data obtained during winter (1973-74) stratification indicated some loss of identity of surface layers of water during a late January thaw, however, on a whole lake basis the same pattern of an early C02 anomaly and a later positive anomaly persisted. This cycle of unusual 02 uptake and C02 release suggests the uncoupling of oxidation from reduction in the sediments during most of the annual cycle and on a diurnal basis. Benthic respiratory quotients were found to increase with the duration of stratification, which suggests that RQ's are related to the redox potential and capacity of the sediments and not entirely to the composition of benthic organic matter. (de Lara-Connecticut)
W76-11907

PETROLEUM DEGRADATION IN LOW TEMPERATURE MARINE AND ESTUARINE ENVIRONMENTS,
Rhode Island Univ., Kingston. Dept. of Plant Pathology-Entomology.
For primary bibliographic entry see Field 5B.
W76-11924

THE BIOLOGICAL AND ECOLOGICAL EFFECTS OF OIL POLLUTION IN TROPICAL WATERS. AN ANNOTATED BIBLIOGRAPHY,
Smithsonian Institution, Washington, D. C. Office of International and Environmental Programs.
C. P. Onuf.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-248 899, $4.50 in paper copy, $3.00 in microfiche. Prepared for Agency for International Development, Dept of State, July 1973. 67 p, 112 ref. AID/csd 2608

Descriptors: *Continental Shelf, *Oil pollution, *Environmental effects, *Resources development, *Bibliographies, *Water pollution effects, *Water resources, *Pollution, Biological communities, Ecosystems, Tropical regions, California, Detergents, Fish, Shellfish, Industrial wastes, Littoral, Grasses, Mangrove swamps, Microbial degradation.
Identifiers: *Outer Continental Shelf, Biological effects, Petroleum, Hydrocarbons, Gulf of Mexico, Cuba, Panama, Puerto Rico.

The bibliography contains 112 references to biological and ecological effects of oil pollution in tropical waters with some involving effects in colder, high altitude waters. Formal annotations are supplemented by comments made by the compiler. (See also W76-11935) (Sinha - OEIS)
W76-11936

RESULTS OF OCEAN DIFFUSION AND BIOLOGICAL STUDIES OF THE HOLLYWOOD, FLORIDA, OCEAN OUTFALL,
Environmental Science and Engineering, Inc., Gainesville, Fla.
For primary bibliographic entry see Field 5B.
W76-11938

A STUDY OF THE EFFECTS OF DETERGENTS ON TYPICAL BILGE WATERS AND CORRELATION OF OIL PARTICLE SIZES,
General Electric Co., Philadelphia, Pa. Re-Entry and Environmental Systems Div.
E. Batutis, H. Hogue, and J. McGinn.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-A020 172, $7.75 in paper copy, $3.00 in microfiche. U. S. Coast Guard Final Report No. USCG-D-177-75, July 1975. 222 p, numerous fig and ref, append. DOT-CG-43287.

Descriptors: *Water pollution, *Detergents, *Waste water disposal, *Oil pollution, *Emulsifiers, *Oily water, Particle size, Oil wastes, Water resources.
Identifiers: *Bilge water.

Oil removal systems for treating bilge water are drastically affected by the condition, composition, and character of the incoming bilge water-oil mixture. The presence of various detergents and cleansers causes emulsification of hydrocarbon products already present. The extent of emulsification caused by synthetic detergents on eight oils was studied at a fixed agitation rate and intensity as a function of detergent type (cationic, anionic, or non-ionic) and concentration as well as temperature, pH, and salinity of the continuous (external) phase (distilled water). Laboratory test emulsions were generated using ultrasonic agitation, coupled with high speed non-aerating dispersion to simulate the type of emulsions produced by the action of a centrifugal pump. A HIAC Particle Counter was used to determine the amount of oil emulsified. The conclusions indicated that: (1) Detergents with cationic-active ingredients would promote a higher degree of emulsification than those with non-ionic or anionic type surfactants. (2) The amount of oil emulsified under fixed agitation rate and intensity and fixed oil concentration does not increase proportionally with increasing detergent concentrations. (3) The concentration of emulsified oil tends to approach a nearly constant value with increasing detergent concentration. (4) At low concentrations of detergent, 100 ppm, the effect of some detergents seems to be one of de-emulsification. An appendix is included in this report covering a correlation of particle size data generated by a number of investigators. (Sinha - OEIS)
W76-11939

RELEASE OF DISSOLVED ORGANIC MATTER BY AUTOLYSIS OF A SUBMERSED MACROPHYTE, SCIRPUS SUBTERMINALIS,
National Inst. for the Environment, Tsukuba (Japan).
A. Otsuki, and R. G. Wetzel.
Limnol Oceanogr. 19(5), p 842-845, 1974.

Descriptors: Dissolved solids, *Organic matter, Production, Primary productivity, Lakes, Carbon.
Identifiers: *Autolysis, *Macrophytes, *Scirpus-Subterminalis, Total organic carbon, Angiosperms, Oxic conditions, Anoxic conditions.

Of the net production of the submersed freshwater angiosperm S. subterminalis, 30-40% was released as dissolved organic matter on autolysis. Most of the autolytic organic matter was released within 5 days under both oxic and anoxic conditions and represents a major source of total dissolved organic C to a hard water lake in which the plant dominates primary productivity.--Copyright 1975, Biological Abstracts, Inc.
W76-11942

FOLLOW-UP FIELD SURVEY OF THE OIL POLLUTION FROM THE TANKER 'METULA',
Texas A and M Research Foundation, College Station.
R. W. Hann, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A017

100, $4.50 in paper copy, $3.00 in microfiche. U.S. Coast Guard Final Report No. USCG-D-166075, September 1975. 56 p, 21 fig, 2 append. DOT-CG-42444-A.

Descriptors: *Oil spills, *Oil pollution, *Environmental effects, *Water fowl, *Mussels, Intertidal areas, Benthos, Beaches, Coasts, Shellfish, Resources, Fuels, Damages, Straits, Water pollution, Water pollution sources.
Identifiers: Straits of Magellan, Tankers, Crude oil, Mousse, Bunker C fuel oil, Environmental impact.

On August 9, 1974, the METULA, an oil tanker, ran aground on the Satellite Patch Shoal immediately west of the First Narrows in the Straits of Magellan. The initial spill of oil from the METULA was reported to be 6,000 tons. Subsequent spills continued with the largest being 20,000 tons on August 19, until the total reported spill quantity of 51,5000 tons of crude oil and approximately 2,000 tons of Bunker C fuel oil was reached. Over 128 kilometers or 80 miles of beach have evidence of oil impact. There appears to be substantial biological impact of the intertidal marine life, but the effect on other marine organisms is hard to determine. In the heavily oiled areas, most adult mussels appear to be living, however, an absence of very small or juvenile mussels was noted. Changes in benthal worm populations and algae were also noted. Further information on the biological community will be available after laboratory studies of collected samples. The oil spill is still having a detrimental effect on marine waterfowl and will continue to do so as long as unstabilized oil or mousse is located at the top of the beach zone and estuarine areas and as long as contaminated mussels are used as a food source. It was evident from the study that there are other major sources of oil pollution in the Straits and the effect of these chronic sources could ultimately prove damaging to marine resources and most definitely would make the proving of damages more difficult in any future incident. (Sinha-OEIS)
W76-11943

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOLUME 1.
Council on Environmental Quality, Washington, D. C.
For primary bibliographic entry see Field 6G.
W76-11947

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 4, POTENTIAL ONSHORE EFFECTS OF OIL AND GAS PRODUCTION ON THE ATLANTIC AND GULF OF ALASKA OUTER CONTINENTAL SHELF.
Resource Planning Associates, Inc., Washington, D. C.
For primary bibliographic entry see Field 6G.
W76-11951

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 5, POTENTIAL BIOLOGICAL EFFECTS OF HYPOTHETICAL OIL DISCHARGES IN THE ATLANTIC COAST AND GULF OF ALASKA.
Massachusetts Inst. of Tech., Cambridge, Mass.
For primary bibliographic entry see Field 6G.
W76-11952

SOME EFFECTS OF POLLUTANTS ON THE BEHAVIOUR OF THE BIVALVE TELLINA TENUIS,
Marine Lab., Aberdeen (Scotland).
E. A. Stirling.
Marine Pollution Bulletin, Vol. 6 (8), 1975, p 122-124, 3 tab.

Descriptors: *Copper, *Bioassay, *Laboratory methods, Physiology, *Toxicity, *Behavior, *Metabolism, *Mollusks, *Phenols, *Industrial wastes, Clams, Methodology, Chemical wastes, Water pollution effects, Testing.
Identifiers: *Tellina tenuis, Burrowing behavior, Continuous flow bioassay.

Predictions of safe levels of effluent discharge have in the past been largely based on the results of short term acute toxicity tests (LC50s). Such tests are usually carried out in unnatural experimental conditions, and in consequence the results are of only limited value. There is a need to enlarge the concept of the routine bioassay test to include quantitative measurement of the effects of pollutants on behavior, physiology and metabolism. A simple rapid bioassay test is described in which the effect of pollutants on the burrowing of the bivalve Tellina tenuis has been used as a quantitative measure of pollutant effect. (Katz)
W76-11960

ARSENIC IN MARINE ORGANISMS FROM WEST GREENLAND,
B. C. Research Ltd., Vancouver.
A. Bohn.
Marine Pollution Bulletin, Vol. 6(6), 1975, p. 87-89, 2 tab, 12 ref.

Descriptors: *Arsenic compounds, *Marine animals, Marine fish, *Invertebrates, *Mussels, *Molluscs, Marine algae, *Crustaceans, *Zooplankton, *Marine plants, *Path of pollutants, Atlantic Ocean, Physiology, Trace elements, Metals, Water pollution effects.
Identifiers: *Trace metals, Background levels, *Greenland, Tissue metal content.

Natural background levels of trace metals in marine organisms from a West Greenland inlet were studied during the summer of 1972 and 1973. Dry weight arsenic levels ranged from 11.1 to 307 ppm in fish fillets and from 7.6 to 512 ppm in fish livers. Prawns had arsenic levels ranging up to 80.2 ppm, contrasting with 6.0 ppm in planktonic copepods. The results suggest that in certain marine organisms organo-arsenics predominate and are less toxic than inorganic arsenic compounds. (Katz)
W76-11962

CADMIUM LEVELS AND CARBOHYDRATE METABOLISM IN LIMPETS,
Bristol Polytechnic (England). Dept. of Science.
R. Shore, G. Carney, and T. Stygall.
Marine Pollution Bulletin, Vol. 6(12), 1975, p. 187-189, 1 tab, 3 fig, 12 ref.

Descriptors: *Cadmium, *Metals, *Pathology, *Metabolism, Biochemistry, *Mollusks, Physiology, Diets, Digestion, Benthos, Marine animals, Water pollution effects.
Identifiers: *Carbohydrate metabolism, *Limpets, Bristol channel, Glucose levels, Glucose metabolism, Cadmium levels, Glycolytic rate, Tissue cadmium concentration.

Limpets from several sites in the Bristol Channel exhibiting varying degrees of cadmium contamination have been studied. Investigations involved glucose levels and certain aspects of glucose metabolism. The results tentatively suggest that there may be a correlation between cadmium levels and reduced ability to utilize glucose. (Katz)
W76-11963

TRACE METAL CONTENT IN THE AMERICAN OYSTER,
National Marine Fisheries Service, Milford, Conn. Milford Lab.
R. A. Grieg, B. A. Nelson, and D. A. Nelson.
Marine Pollution Bulletin, Vol. 6(5), 1975, p. 72-73, 1 tab, 6 ref.

Descriptors: *Oysters, *Path of pollutants, Transfer, *Reproduction, Biology, *Gonads, Mollusks, *Cadmium, *Copper, Lead, Zinc, Fertility, Chemical analysis, *Connecticut, Marine animals, Water pollution effects, Path of pollutants, Estuarine environment.
Identifiers: *American oyster, *Oyster eggs, *Housatonic River(Conn), Silver.

Information about the transfer of pollutants from adult aquatic animals to their progeny is relatively scarce. This study was designed to measure the transfer of metals from adults to eggs of the American oyster. Two groups of oysters containing significantly different levels of copper and cadmium were induced to spawn, the eggs were collected and trace metal contents measured. The eggs from both groups of oysters contained the same amount of copper, while cadmium levels were below detectable limits in both groups of eggs. Silver, lead and zinc concentrations also were determined. The concentrations of these metals were similar for both groups of adults and eggs; thus, no conclusion could be made about the transfer of these three metals from adults to eggs of oysters. (Katz)
W76-11964

DISTRIBUTION OF SOME TRACE METALS IN POOLE HARBOUR, DORSET,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
For primary bibliographic entry see Field 5B.
W76-11965

TRACE METALS IN OYSTERS FROM KNYSNA ESTUARY,
National Physical Research Lab., Pretoria (South Africa).
For primary bibliographic entry see Field 2L.
W76-11966

TOXICITY OF THREE OILS TO BIVALVE GAMETES AND LARVAE,
Siena Univ. (Italy). Inst. of Comparative Anatomy.
A. Renzoni.
Marine Pollution Bulletin, Vol. 6(8), 1975, p. 126-128, 3 tab, 1 fig, 13 ref.

Descriptors: Oil, *Oil pollution, *Toxicity, *Bioassay, *Mortality, *Mollusks, *Oysters, Laboratory animals, *Growth rates, *Immature growth stage, *Larval growth stage, Life cycle, Environmental effects, Larvae, Fertilization.
Identifiers: *Crude oil, Kuwait crude, Nigerian crude, Prudhoe Bay crude, Developmental abnormalities, Larval survival, Clam spermatozoa.

Water soluble extracts of three crude oils, Kuwait, Nigerian and Prudhoe Bay have been tested using the sperm and eggs of two marine bivalves. Fertilization is depressed and developmental abnormalities sometimes appear after exposure to these toxins. The spermatozoa, in particular, are very sensitive to the water-soluble fractions of these oils. Nigerian crude is particularly toxic. (Katz)
W76-11967

REDUCED GROWTH AND SURVIVAL OF CLAMS TRANSPLANTED TO AN OIL SPILL SITE,
Maine State Dept. of Marine Resources, Augusta.
R. L. Dow.
Marine Pollution Bulletin, Vol. 6(8): 1975, p. 124-125, 1 tab., 3 ref.

Descriptors: *Oil pollution, Environmental effects, Animal physiology, *Mortality, *Growth rates, *Animal growth, *Productivity, *Mudflats, Mollusks, Clams, Estuaries, Oil spills, Intertidal areas, Estuarine environment.

Identifiers: Soft shell clams, Polluted mud, Transplantation, Mya arenaria, Oil spill site.

Production of soft clams fell by 20% in two years following oil pollution although in adjacent mudflats production of them increased by 250%. Transplanting uncontaminated clams into this area confirmed poorer survival and slower growth in polluted mud. (Katz)
W76-11968

HINDGUT MICROFLORA FROM OIL-POLLUTED SOFT-SHELL CLAMS,
Rhode Island Univ., Kingston. Dept. of Plant Pathology-Entomology.
A. M. Cundell, and R. R. Young.
Marine Pollution Bulletin, Vol. 6(9), 1975, p. 134-135. 2 tab.

Descriptors: *Mollusks, Oil, *Oil pollution, Microbiology, *Clams, *Digestion, Metabolism, *Biodegradation, *Aquatic microorganisms, Sediments, Physiology, Animal physiology, Water pollution effects, Estuarine environment, Bays, Rhode Island.
Identifiers: Soft-Shell Clams, Mya Arenaria, Hindgut microflora, Narragansett Bay(RI).

The natural microflora resident in the hindgut of the soft-shell clam Mya arenaria appear to have no role in the biodegradation of petroleum hydrocarbons in oil-polluted estuarine sediments. (Katz)
W76-11969

DISTRIBUTION AND ABUNDANCE OF THE POLYCHAETOUS ANNELIDS IN A SOUTH FLORIDA ESTUARY,
University of South Florida, Tampa. Dept. of Biology.
S. L. Santos, and J. L. Simon.
Bull Mar Sci. 24(3), p 669-689, 1974.

Descriptors: *Florida, Estuaries, *Annelids, Distribution, Vegetation, Estuarine environment.
Identifiers: Diplanthera-Wrightii, Onuphis-Eremita-Oculata, Polychaetous annelids, Thalassia-Testudinum, *Polychaetes.

This distribution and abundance of polychaetous annelids in a subtropical estuarine environment were investigated. The area contained zones of Thalassia testudinum, Diplanthera wrightii, and sand. Quarterly samples were taken from stations established within all zones. No seasonal differences in particle size distribution of sediment were found. The Thalassia zone supports the largest number of organisms. Onuphis eremita oculata was the dominant polychaete. Czekanowski's coefficient and group average sorting were used to determine relationships among the fauna from each zone. Information statistic tests were utilized to delineate classes. Different assemblages of polychaetes were not associated with different vegetative zones. The densities of the individual species from the one assemblage present in Lassing Park, St. Petersburg, Florida, varied by season and by zone.--Copyright 1975, Biological Abstracts, Inc.
W76-11987

HOW MODERN TECHNOLOGY IS ENDANGERING OUR LIVES: OCEAN POLLUTION,
For primary bibliographic entry see Field 5G.
W76-12018

STRUCTURE AND FUNCTION OF STREAM ECOSYSTEMS,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
For primary bibliographic entry see Field 2I.
W76-12137

CARBON-13 ENRICHED CARBONATE IN INTERSTITIAL WATERS OF LAKE KINNERET SEDIMENTS,
Weizmann Inst. of Science, Rehovoth (Israel). Dept. of Isotope Research.
M. Stiller, and M. Magaritz.
Limnol Oceanogr. 19(5), p 849-852, 1974.

Descriptors: *Lake sediments, *Carbonates, Connate water, *Dissolved solids, Lakes, Asia, Alkalinity, *Calcite, Decomposing organic matter, Anaerobic conditions, Calcium carbonate.
Identifiers: Carbon-13, *Lake Kinneret(Israel).

Dissolved carbonates in interstitial waters of Lake Kinneret sediments (Galilee, Israel) are enriched in 13C by 10-20% over the dissolved carbonate in the lake water. The increase of alkalinity which accompanies this enrichment indicates in situ formation of dissolved carbonate. The interstitial waters are slightly undersaturated in respect to calcite, but dissolution of CaCO3 cannot explain the enriched 13C values. The enrichment of 13C in the pore water carbonate is probably related to the anaerobic decomposition of organic matter in the sediments.--Copyright 1975, Biological Abstracts, Inc.
W76-12140

TRANSFORMATIONS OF METHYLAMINES AND FORMATION OF A HAZARDOUS PRODUCT: DIMETHYLNITROSAMINE, IN SAMPLES OF TREATED SEWAGE AND LAKE WATER,
International Inst. of Tropical Agriculture, Ibadan (Nigeria).
For primary bibliographic entry see Field 5B.
W76-12141

CHLORAMINE-T FOR THE CONTROL OF ICHTHYOPHTHIRIUS MULTIFILIIS (FOUQUET),
Ministry of Agriculture, Fisheries and Food, London (England). Salmon and Freshwater Fisheries Lab.
D. G. Cross, and P. A. Hursey.
J Fish Biol. 5(6), p 789-798, 1973.

Descriptors: *Toxicity, Testing, Organic compounds, Protozoa, Parasites, *Fish diseases, Hydrogen ion concentration.
Identifiers: *Ichthyophthiriasis, *Ichthyophthirius-Multifiliis, Parasit-Drug, Rasbora-Heteromorpha, Rutilus-Rutilus, *Chloramine-T, *Amines.

Tests were conducted to determine the toxicity of chloramine-T to the free-living stages of the protozoan parasite I. multifiliis and the fish Rasbora heteromorpha and Rutilus rutilus with the view to using the reagent to control ichthyophthiriasis. The toxicity was dependent on the pH value of the water and, to a lesser extent, its hardness. A method of treating the disease is proposed and discussed.--Copyright 1974, Biological Abstracts, Inc.
W76-12143

5D. Waste Treatment Processes

WATER POLLUTION CONTROL: CROSSROADS OF A MUNICIPAL FINANCIAL DILEMMA,
North Texas State Univ., Denton. Dept. of Administrative Sciences and Marketing.
F. P. Williams, and A. C. Rucks.
Public Works, Vol. 107, No. 6, p 86-88, June, 1976. 1 fig, 1 tab, 21 ref.

Descriptors: *Waste water treatment, *Treatment facilities, *Analytical techniques, *Water pollution control, *Financing, Local governments, Economics, Decision making.

Financial and economic considerations are needed in environmental decision making. The discussion includes the amount of financing required by municipalities, the goals of the Water Pollution Control Act Amendments of 1972, some alternative financial resources available to municipalities, and the need for careful evaluation of these alternatives. The Environmental Protection Agency (EPA) estimated, via the 1974 'Needs Survey,' that municipalities will require an investment of $114.6 billion in waste treatment facilities to accommodate urban populations in 1990. The per capita costs were estimated at $549 in 1972 and $464 in 1990. Adjusted estimates are $1,500 per capita in 1972 and $1,265 per capita in 1990. The traditional methods of financing municipal projects such as waste water treatment include property taxes, user charges, special assessments, and bond issues. The EPA also provides waste treatment construction grants. Cities have encountered difficulties, however, in obtaining these funds. It has also been reported that some states are penalized with respect to funds because their cities have been more effective than others in applying advanced waste treatment technology. The effects on individual cities of alternative forms of financing should be analyzed. The analysis should include cost estimates for achieving national water quality goals, an appraisal of the ability of internal sources of funds to meet these costs and the extent to which external sources will be needed, and an appraisal of the per capita impact of using alternative sources of funds. (Snyder-FIRL)
W76-11626

ODOUR CONTROL AT TORONTO'S ASHBRIDGES BAY TREATMENT PLANT.
Water and Pollution Control, Vol. 114, No. 6, p 40-41, June, 1976. 1 fig.

Descriptors: *Waste water treatment, *Sewage treatment, *Treatment facilities, Odor, Control, Incineration, Screens, Ozone, Oxidation lagoons, *Canada.
Identifiers: Aeration tanks, Aerated grit tanks, Primary tanks, Scrubbers, *Odor control.

Odor control facilities are being installed in three municipal sewage treatment plants in Toronto. Major sources of the odors at the Main Treatment Plant, Ashbridge Bay, were found to be the aeration tanks, multi-hearth incinerators, aerated grit tanks and screens, and primary tanks. The aeration tank odors, consisting of normal spent diffused air plus ventilated air from the covered primary tanks, will be eliminated by ozonation, followed by wet scrubbing. With this system, any odors not oxidized by ozonation will be oxidized in the cross flow scrubbers. The level of ozone in the discharged air, after scrubbing, will be below the 0.08 ppm limits required by law. A detailed description of the system is provided, including the axial fans to discharge emission air, measurement instrumentation for ozone pressure and concentration, and process automation facilities. (Kramer-FIRL)
W76-11627

ALTERATION OF MICROBIAL POPULATIONS IN THERMAL STRESS,
Texas Univ. Health Science Center, Houston. School of Public Health.
R. K. Guthrie, D. S. Cherry, and F. L. Singleton.
Journal Water Pollution Control Federation, Vol. 48, No. 5, p 962-965, May, 1976. 3 fig, 7 ref.

Descriptors: *Waste water treatment, *Biological treatment, *Thermal stress, *Bacteria, *E coli, Municipal wastes, Pathogenic bacteria, Enteric bacteria, Coliforms, Streptococcus, Salmonella, Evaluation.

The hypothesis that thermal loading to 31 C in waste water effluent to which Flavo-bacterium lutescens is added increases the die-off rates of Escherichia coli, Streptococcus faecalis, and the

enteric pathogen Salmonella typhimurium was tested. In laboratory tests using municipal waste water containing Flavobacterium lutescens and heated to 31 C, Streptococcus faecalis counts remained stable for 2 weeks and then dropped to zero by day 20. Escherichia coli counts remained constant for 1 week and then declined gradually to zero on day 14. Salmonella typhimurium counts remained stable for 2 weeks at 31 C before a rapid decline began, and no colonies were detected by day 30. The results indicate that the use of a naturally occurring aquatic bacterial species in combination with thermal stress offers a potential control of undesirable or pathogenic bacterial contaminants in aquatic systems. (Kreager-FIRL)
W76-11629

REMOTE CONTROL OF COMBINED SEWER OVERFLOWS,
Watermantion, Inc., Saint Paul, Minn.
J. J. Anderson, and R. L. Callery.
J Water Pollut Contr Fed. 46(11), p 2555-2564, 1974.

Descriptors: *Combined sewers, *Remote control, *Overflow, Instrumentation, Costs, Distribution, Automatic control, Minnesota, Cities.
Identifiers: Minneapolis-St. Paul(Minn).

Overflows from combined sewers may be controlled by the use of simple regulator modifications and readily available computer and telemetering technology, as was demonstrated in Minneapolis-St. Paul, Minnesota. This method of control produced a 52% decrease in overflow incidence and an 84% reduction in overflow quantity in 1970. Combined snow-melt runoff and wastewater overflow were nearly eliminated. Total project costs were estimated. The system yielded data on temporal and spatial distribution of precipitation in the area.--Copyright 1975, Biological Abstracts, Inc.
W76-11630

EFFICIENCY OF A SEPTIC TILE SYSTEM,
ADI Ltd., Fredericton (New Brunswick).
T. Viraraghavan, and R. G. Warnock.
Journal Water Pollution Control Federation, Vol. 48, No. 5, p 934-944, May, 1976. 8 fig, 3 tab, 11 ref.

Descriptors: *Tiles, *Tile drainage, *Septic tanks, *Waste water treatment, On-site tests, Efficiencies, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Phosphates, Ammonia, Nitrification, Carbon, Organic compounds, Performance.

A field investigation to determine the efficiency of a septic tile system was conducted near Ottawa, Ontario. The test tile was at an average depth of 26 in, and the soil in the area was a mixture of Piedmont (sandy loam texture) and Pontiac (silt loam to silty clay loam texture). The results indicated that the surrounding soil reduced total suspended solids, biochemical oxygen demand, chemical oxygen demand, and soluble organic carbon by 75-90% of their levels in the septic tank. Reductions of phosphates were usually in the 25-50% range, much lower than those reported in the literature. Ammonia reductions ranged between 80 and 90%, and increases in ammonia reduction were generally accompanied by corresponding increases in nitrification. The efficiency of the septic tile system was influenced by seasonal variations, with greater efficiencies (80-90%) being observed in late summer and early fall. (Kreager-FIRL)
W76-11631

PHOSPHORUS TRANSPORT IN A PACKED BED REACTOR,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
A. R. Overman, R-L. Chu, and W. G. Leseman.
Journal Water Pollution Control Federation, Vol. 48, No. 5, p 880-888, May, 1976. 11 fig, 11 ref.

Descriptors: *Packed beds, *Model studies, *Tertiary treatment, *Waste water treatment, *Phosphorus, Chemical reactions, Dispersion, Adsorption, Convection, Flow rates, Municipal wastes, Irrigation, Mathematical models.
Identifiers: Fixed bed reactors.

A dispersed flow model of phosphorus transport in a packed bed reactor (soil) was developed to gain information on the fate of this nutrient in advanced waste treatment processes handling municipal waste water. The model adequately described both transient response and steady-state distributions and showed that the processes of dispersion, convection, chemical reaction, and adsorption are relevant to transport. Transport coefficients of dispersion, reaction, and adsorption were found sensitive to pore velocity (flow rate); this apparently was due to the treatment of a heterogeneous reactor as an equivalent homogeneous reactor for the purpose of providing a transport equation amenable to mathematical solution. The usefulness of the model is not particularly limited by this approximation. Phosphorus measurements from a field under irrigation with municipal waste water (fixed bed reactor) exhibited a steady-state distribution which closely agreed with that of the laboratory model (packed bed reactor). (Kreager-FIRL)
W76-11632

MOST PROBABLE NUMBER VERSUS MEMBRANE FILTER ON CHLORINATED EFFLUENTS,
Rockland County Sewage Treatment Plant, Orangeburg, N. Y.
A. Mowat.
Journal Water Pollution Control Federation, Vol. 48, No. 4, p 724-728, April, 1976. 3 tab, 4 ref.

Descriptors: *Coliforms, *Analytical techniques, *Sewage treatment, *Treatment facilities, *Chlorination, *Quality control, Statistics, Evaluation, Microorganisms, Bacteria, Waste treatment, Effluents, Measurement, Membrane processes, *Pollutant identification.
Identifiers: Most probable number technique.

A total of 25 experiments were conducted at a sewage treatment plant using the activated sludge process to compare the results obtained by the most probable number and membrane filter techniques for total coliform determination on chlorinated and unchlorinated secondary effluent. Great discrepancies between the two methods were observed for unchlorinated effluent, whereas good correspondence between the two techniques was obtained for chlorinated secondary effluent, especially at bacterial densities below 1000. Samples with 30-minute chlorination times yielded better agreement between the two techniques than did samples with only 15-minue chlorination times. This may indicate that the longer chlorination time effected a good kill of the bacteria, while the shorter chlorination time was only partially effective, allowing recovery of the bacteria under favorable conditions. The discrepancy between the two methods for unchlorinated samples remains unexplained. (Kreager-FIRL)
W76-11635

EPA GUIDANCE AND POLICY ON LAND TREATMENT,
Environmental Protection Agency, Washington, D. C. Office of Water Programs.
J. T. Rhett.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 1-2.

Descriptors: *Waste water treatment, *Waste water disposal, *Federal jurisdiction, *Land use, Legislation, Financing, Economics, Groundwater.
Identifiers: *Land application.

Environmental Protection Agency policies on waste water treatment and disposal are reviewed, with particular emphasis on land treatment. An agency document entitled 'Alternative Waste Management Techniques for Best Practicable Waste Treatment' identifies currently known techniques for meeting the requirements of the Water Pollution Control Act Amendments. The choice of which alternative to adopt is left to each municipality or regional sanitary district; however, if an area receives federal funds, it must be guided by the Agency's cost effectiveness regulations. Any land application or land utilization techniques considered must comply with criteria designed to protect groundwaters in order to qualify for federal funding. The deputy administrator of the Environmental Protection Agency has indicated that land treatment may be used in lieu of other systems of waste management if it can be demonstrated land treatment is the most cost effective alternative, is consistent with the environmental assessment, and satisfies applicable tests. (See also W76-11231) (Kreager-FIRL)
W76-11638

PUBLIC HEALTH ASPECTS OF LAND APPLICATION OF WASTEWATER EFFLUENTS,
Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
C. A. Sorber.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 27-33. 7 tab, 18 ref.

Descriptors: *Overland flow, *Infiltration, *Irrigation, *Public health, *Waste water treatment, Pathogenic bacteria, Sodium, Ions, Nitrates, Ponding, Mosquitoes, Diseases, Dissolved solids, Potable water, Municipal wastes, Aerosols.
Identifiers: *Land application.

Waste water treatment involving such land application methods as overland flow, rapid infiltration, and spray irrigation is discussed in terms of its public health impacts. In general, potential health and environmental problems can be minimized by proper waste water treatment and proper site selection. Problems that may be encountered include pathogenic aerosols near spray sites, the enhancement of mosquito breeding at ponding sites, and the presence of sodium and nitrate ions as well as total dissolved solids where waste water recycle is practiced. High sodium contents may be harmful to individuals suffering from cardiac, renal, and circulatory diseases. The nitrate ion is the causative agent of methemoglobinemia in children, and a concentration of no more than 10 mg/liter for nitrate-nitrogen is recommended for drinking water supplies. Pathogens in waste water represent one of the major potential health problems associated with recycling municipal waste water on the land. (See also W76-11231) (Kreager-FIRL)
W76-11639

EDUCATIONAL AND INFORMATIONAL NEEDS FOR ACHIEVING PUBLIC ACCEPTANCE,
Purdue Univ., Lafayette, Ind. Cooperation Extension Service.
For primary bibliographic entry see Field 5G.
W76-11640

THE ENVIRONMENTAL AND SOCIOLOGICAL IMPACT OF RECYCLING OF AGRICULTURAL WASTE BY LAND USE,
Green Valley Farms, Avondale, Pa.
B. J. Reynolds.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 53-57. 2 ref.

Descriptors: *Irrigation, *Waste treatment, *Recycling, *Waste disposal, *Farm wastes, Stabilization, Ponding, Effluents, Ammonia, Coliforms, Phosphates, Bacteria, Biochemical oxygen demand, Crop production, Social aspects, On-site investigations.

The results of an experimental agricultural waste recycling program being conducted at the Green Valley Farms in New Garden Township, Pennsylvania are presented. The basic raw material being recycled is manure effluent discharged by 200 head of milking cows into two stabilization ponds. The effluent is composed of the manure and urine excreted by the animals, wash water for cleaning the concrete pads, and milkhouse and milking parlor wastes. The biologically treated effluent is applied to crops and woodlands by a spray irrigation system. As a result of the growth of the crops and woodlands, the following waste removals are observed: 99.6% of the ammonia in the treated effluent (there is no nitrate in the stabilization ponds), 99.6% of the phosphates, 5-day biochemical oxygen demand, and total as well as fecal coliform. Waste recycling on the farm has resulted in a doubling of corn production, a tripling of soybean production, and large increases in both the tonnage and protein content of grasses. The community response to the land treatment program has been very favorable. (See also W76-11231) (Kreager-FIRL)
W76-11641

EXPERIENCE WITH LAND APPLICATION OF WASTEWATER AND STATE REGULATIONS - THE PENNYPACK WATERSHED,
Martin (A. W.) Associates, Inc., King of Prussia, Pa.
G. H. Emrich.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 69-63. 6 fig.

Descriptors: *Irrigation, *Waste water disposal, *Recycling, *Water management(Applied), *Water supply, Groundwater, Surface waters, Watersheds(Basins), Wells, Waste treatment, Regulation, *Pennsylvania.
Identifiers: *Land application, Pennyback watershed(Penn).

The water balance for the Pennypack Watershed is analyzed, and spray irrigation of waste water is concluded to be the most cost-effective waste treatment option for the area. The watershed is capable of accepting up to 4.5 million gallons/day or 1.5 billion gallons/year of treated waste water. This could create a significantly desirable effect on the base flow in the streams and tributaries near the spray areas or could be developed as a groundwater supply. Assuming that 2 in/week of treated waste water (the maximum permitted in Pennsylvania) is spray irrigated onto a site and assuming 80% infiltration, 83 in. of additional water is added to the groundwater reservoir each year. It also is possible to selectively develop water well fields which are contiguous with the spray irrigation fields, thus enabling the recapture of an estimated 50% of the spray irrigated water for public water supply use. The remaining 50% would supplement the base flow in nearby streams. (See also W76-11231) (Kreager-FIRL)
W76-11642

EXPERIENCE WITH LAND APPLICATION OF WASTEWATER AND STATE REGULATIONS - PENNYPACK WATERSHED-PENNSYLVANIA,
Pennypack Watershed Association, Bryn Athyn, Pa.
F. U. Pitcairn.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 65-67. 3 ref.

Descriptors: *Irrigation, *Water management(Applied), *Waste water disposal, *Sewage treatment, *Recycling, *Water supply, Groundwater, Surface waters, Watersheds(Basins), Waste water treatment, Costs, Regulation, Legislation, Land use, Regional development, *Pennsylvania.
Identifiers: *Land application, Pennyback watershed(Penn).

Water quantity management for the Pennypack Watershed in Pennsylvania is discussed in terms of existing state legislation and the desirability of applying secondarily treated sewage to the land via spray irrigation. The only plan now in existence for the watershed are 10-year plans for sewage facilities in accord with the provisions of the Pennsylvania Sewage Facilities Act. These plans are piecemeal, fragmented attempts to solve short-term problems, with little attention devoted to long-term, regional water management. The Pennypack Watershed Association has identified more than 600 acres of land eminently suited for spray irrigation; these lands could handle up to 4 million gallons/day of secondarily treated sewage. Spray irrigation is capable of recharging the groundwater supply, maintaining the watershed's water balance, augmenting stream flows, minimizing water pollution, and reducing water treatment costs by obviating the necessity for tertiary treatment. (See also W76-11231) (Kreager-FIRL)
W76-11643

LAND DISPOSAL OF WASTEWATER IN THE COMMONWEALTH OF PENNSYLVANIA - A REGULATORY VIEW,
Pennsylvania Department of Environmental Resources, Harrisburg. Burea of Water Quality Management.
S. F. Curran, Jr.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 69-70. 3 ref.

Descriptors: *Irrigation, *Waste water disposal, *Waste water treatment, *Recycling, *Regulation, *State jurisdiction, *Pennsylvania, Water management(Applied), Sites, Groundwater, Treatment.
Identifiers: *Land application.

Waste water disposal via spray irrigation in the Commonwealth of Pennsylvania is discussed from a regulatory point of view. Since large amounts of waste water discharged to the land surface infiltrate and recharge groundwater, all spray irrigation installations in Pennsylvania are considered as discharges to the waters. Spray irrigation should be used only in situations where the waste water contains materials that can be renovated in the soil mantle and do not pollute groundwater. Generally, the equivalent of secondary treatment must precede the irrigation. The Pennsylvania Department of Environmental Resources makes allowances for variability of earth materials, spray field use, and effluent constituents in reviewing installation proposals on a site by site basis. The prime consideration for site selection is the ability of the organic and earth materials to properly treat the waste water. (See also W76-11231) (Kreager-FIRL)
W76-11644

DISINFECTION, DECHLORINATION AND TOXICITY TO FISH,
International Pacific Salmon Fisheries Commission, Cultus Lake (British Columbia). Sweltzer Creek Salmon Research Lab.
For primary bibliographic entry see Field 5C.
W76-11645

VIRAL CONTAMINATION OF THE WATER ENVIRONMENT, AN UNDERESTIMATED PROBLEM,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W76-11646

COMPUTER AIDED PLANNING OF A REGIONAL DISPOSAL SYSTEM FOR MUNICIPAL SLUDGE,
B and P Engineers, Kitchener (Ontario).
F. J. Allan, P. L. Silveston, W. L. Keay, and E. R. Simonen.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 115-135. 10 fig, 4 tab.

Descriptors: *Sludge disposal, *Computer programs, *Cost analysis, *Regional analysis, Municipal wastes, Waste disposal, Treatment facilities, Planning, Economics, Regional development.

A computer program for planning the regional disposal of municipal sludge is described. The program is capable of searching numerous alternatives which exist between the two extremes of a centralized facility serving all sludge sources and a decentralized disposal system with a disposal system for each sludge source. The computer program divides sludge disposal planning into three interacting sub-problems: facility planning, allocation of sludge to the facilities, and sludge transport planning. The planner submits several locations and types of facilities to the computer which searches for the most economic system. A user training manual which provides information on data sources and set-up procedures is also available. (See also W76-11249) (Kreager-FIRL)
W76-11647

URBAN DRAINAGE - PROBLEMS AND POSSIBILITIES,
Nova Scotia Technical Coll., Halifax. Dept. of Civil Engineering.
D. H. Waller.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 136-153. 3 tab, 17 ref.

Descriptors: *Drainage water, *Drainage systems, *Urban drainage, *Urban runoff, *Soil erosion, Sewers, Surface waters, Groundwater, Turbidity, Water pollution effects, Land use, Land development, Sediment load, Effluents, Industrial wastes, Municipal wastes.

Problems associated with urban drainage are reviewed along with some proposed solutions. Changes in ground cover and surface topography that occur as a result of urban development are associated with a drop in groundwater level, decreased stream flows during dry weather, and increased soil erosion which results in surface water turbidity and sediment accumulation in lakes, storage basins, and sewage plants. Drainage problems associated with already developed urban areas include those associated with overloaded drainage systems and pollution problems due to combined sewer overflows, urban surface runoff, and municipal and industrial effluents. Solutions proposed for such problems include: careful land development which takes advantage of natural storage, combined sewer separation, source and collection system controls, storage systems which are capable of holding wet flow for treatment following storm periods, and treatment systems that are designed to handle wet weather flows. The value of using urban drainage system models for solving the above problems is also discussed. (See also W76-11249) (Kreager-FIRL)
W76-11648

SAFETY IN WATER AND WASTEWATER PLANTS,
Ontario Ministry of the Environment (Toronto).
For primary bibliographic entry see Field 5G.
W76-11652

OPERATOR TRAINING AND CERTIFICATION IN CANADA,
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W76-11653

TRAINING AND CERTIFICATION,
Ontario Ministry of the Environment, Toronto. Training, Certification and Safety Section.
For primary bibliographic entry see Field 5G.
W76-11654

NORTHERN ENVIRONMENTAL ENGINEERING - A CANADIAN CHALLENGE,
Stanley Associates Engineering Ltd., Edmonton (Alberta).
R. N. Dawson, and J. W. Slupsky.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 376-402. 7 tab, 13 ref.

Descriptors: *Waste treatment, *Water supply, *Climates, *Topography, *Canada, *Water pollution effects, Sewage treatment, Waste water treatment, Viruses, Model studies, Computer programs, Temperature, Permafrost, Incineration, Biological treatment, Pipelines, Oxidation lagoons, Research and development, Programs.
Identifiers: Northwest Territories.

Research programs dealing with water supply and waste disposal in the Northwest Territories of Canada are reviewed. Studies currently being conducted include: the feasibility of using vacuum toilets and incineration for the disposal of human wastes at construction campsites; the economics and operating problems associated with trailer-mounted physical-chemical sewage treatment systems; the suitability of rotating biological contactors for treating workcamp waste water; the determination of virus removal rates from waste waters generated by current treatment methods; the use of steady state computer models for predicting subsidence and temperature profiles in oxidation lagoon berms located in permafrost soils; the fate of human wastes which are dumped into pits in arctic areas; the effect of buried pipelines on permafrost thawing; and, the practicability and efficiency of long retention lagoons used for waste water treatment at high latitudes. Special attention is being devoted to the adverse weather and terrain conditions of the Northwest Territories which result in a more fragile ecology and the need for a better understanding of the impact of waste disposal practices. (See also W76-11249) (Kreager-FIRL)
W76-11655

THE SYMBIOTIC APPROACH TO WATER REUSE IN ST. PETERSBURG, FLORIDA,
Black, Crow and Eidsness, Inc., Clearwater, Fla.
L. A. Dove.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 15-22. 3 fig, 3 tab, 16 ref.

Descriptors: *Water reuse, *Recycling, *Byproducts, Waste water treatment, Sludge, Fertilizers, Dewatering, Drying, Irrigation, Injection wells, Groundwater, Florida, Cities, Research and development, Potable water, Water utilization, Treatment facilities, Waste treatment.

Research and development programs employing the symbiotic approach for water reuse in St. Petersburg, Florida are outlined. The programs include: Deep well injection and possible recovery of storm water and treated waste water as a replacement for imported groundwater; zero discharge and total recycling of treated waste water for irrigation, air conditioning, power plant uses, and other applications; the installation of 25,000 water-saving devices in private toilets to reduce potable water usage; the production of dried waste water sludge for sale to commercial fertilizer compounders; and the application of digested sludge as a soil conditioner. A tentative layout for a centralized sludge dewatering and drying facility for the city is also presented. (See also W76-11257) (Kreager-FIRL)
W76-11656

SOLID WASTE, SEWAGE, AND ENERGY - A SYMBIOTIC APPROACH,
Energy Management Group, New York.
J. C. Dale.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 35-36.

Descriptors: *Water reuse, *Recycling, *Waste water treatment, *Cities, Water supply, Industrial wastes, Municipal wastes, Sewage, Water utilization, Fuels.

The potential benefits of using a symbiotic approach to solve problems associated with the generation of municipal and industrial solid wastes and sewage, industrial water supply needs, and fuel shortages are discussed. A hypothetical example involving a city with a population of 100,000 is used to show that waste garbage, sewage, and animal wastes can be used for producing gas fuel for industrial needs and char which can be used as filter media for tertiary treatment at a sewage treatment plant. The treated sewage effluent can then be reused for industrial purposes not requiring potable water. (See also W76-11257) (Kreager-FIRL)
W76-11657

THE U. S. ENVIRONMENTAL PROTECTION AGENCY: PAST AND FUTURE CHALLENGES,
Environmental Protection Agency, Washington, D. C.
R. E. Train.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 43-45.

Descriptors: *Water reuse, *Recycling, *Symbiosis, *Municipal wastes, *Waste water, Irrigation, Reclamation, Reclaimed water, Recreation facilities, Lakes, Industrial water, Research and development, Government supports, Government finance, Organizations, Treatment facilities.
Identifiers: *Environmental Protection Agency.

Environmental Protection Agency activities in the areas of waste water treatment and water reuse are reviewed along with future challenges in these areas. Since the establishment of the Agency, it has committed almost $11 billion in grants to states and communities for the construction of waste water treatment plants. The Agency has put strong emphasis on research and development activities associated with water reuse. The reuse of municipal waste water is currently being practiced on a continuing basis in 358 locations throughout the United States, chiefly in the semi-arid southwestern states. Principal applications for waste water reuse include irrigation and landscaping, industrial cooling and processing water utilization, and recreational lake maintenance. The present reuse of waste water, however, is small in relation to the amount of municipal waste water being generated, and expanded practice and continued development of municipal waste water reclamation is required. (See also W76-11257) (Kreager-FIRL)
W76-11658

A COMPUTER BASED OPERATIONAL STRATEGY FOR THE JOINT TREATMENT OF MUNICIPAL AND INDUSTRIAL WASTEWATERS,
Houston Univ., Tex.
J. F. Andrews, and G. Olsson.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 60-64. 2 fig.

Descriptors: *Waste water treatment, *Industrial wastes, *Municipal wastes, *Computer programs, *Model studies, *Simulation analysis, Treatment facilities, Biological treatment, Control systems.
Identifiers: Municipal-industrial wastes treatment, *Combined treatment.

A computer-based strategy for the combined treatment of municipal and industrial waste water is described which overcomes problems associated with the detrimental effects of certain industrial wastes on biological treatment processes. The basis of the strategy is the scheduling of batch dumps of industrial wastes so that they arrive at the treatment plant relatively unmixed with other waste water. This can be accomplished by real-time computer simulations using a dynamic model of the sewerage system. The discharge of batch industrial wastes to municipal sewers are timed in such a manner that their transport to combined treatment plants occurs when the municipal waste water flow rate is at its lowest. Upon arrival at the treatment plant, the mixture of waste waters can be diverted to a variable volume holding tank and then, depending on the characteristics of the industrial waste, be bled into the biological process over the full 24-hour period or treated by physical and/or chemical processes prior to discharge into the biological process for further treatment. (See also W76-11257) (Kreager-FIRL)
W76-11659

TRANSPORT OF CONCENTRATES AND SLUDGES,
Culp, Wesner, Culp-Clean Water Consultants, El Dorado Hills, Calif.
For primary bibliographic entry see Field 5E.
W76-11660

PROJECT CURE,
Environmental Protection Agency, Cincinnati, Ohio.
D. G. Stephan.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 286-289. 1 tab, 3 ref.

Descriptors: *Waste water treatment, *Tertiary treatment, *Surface waters, *Water management(Applied), *Reclamation, *Recreation facilities, *Rivers, Channels, Lakes, Impounded waters, Artificial watercourses.

Project CURE (Clean Urban River Environments), a research proposal prepared in 1969 jointly by the Mid-Continent region of the Bureau of Outdoor Recreation and the Missouri Basin of the Federal Water Pollution Control Administration, is described. The proposed project involves the advanced treatment of waste water very near its points of use and collection followed by releases of the highly treated effluent into either natural or specially created channels and impoundments. The objective of the project is to create newly-formed rivers and lakes for water-oriented outdoor recreation and for the enhancement of the urban environment. Treatment plants are expected to be relatively small and located in or near homogeneous suburban areas at the fringes of the city. The additional costs associated with the construction of such treatment facilities are expected to be somewhat offset by the fact that extensive sewers will be unnecessary. Existing sewers could be utilized for transporting storm water runoff, and existing treatment plants could likewise be used for treating storm water runoff, thus increasing the overall quality of treated water. (See also W76-11257) (Kreager-FIRL)
W76-11661

LOWER WALLER CREEK MASTER IMPROVEMENT PLAN,
Taniguchi, Shefelman, Vackar, and Minter, Austin, Tex.
T. W. Shefelman, and A. H. Ullrich.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 305-309.

Descriptors: *Water management(Applied), *Floodproofing, *Waste water treatment, *Streams, *Cities, Surface waters, Groundwater, Monitoring, Land use, *Texas, Planning.

Identifiers: Waller Creek(Tex).

A plan for improving the flow and flooding characteristics as well as water quality is proposed for lower Waller Creek which runs through the economically depressed eastern edge of the central business district in Austin, Texas. Methods being considered for supplementing flow include: drilling wells in the drainage area and discharging pumped groundwater into the channel, pumping town lake water to some upstream point and discharging it into the channel, and operating the existing municipal swimming pools in the drainage area on a flow-through basis for discharge into the creek channel. Concepts for flood control being considered include: upstream flood retarding structures, channel modifications, relocations of man-made obstacles, and flood water bypasses around bridges and possibly other channel restrictions. Plans for improving the water quality include: storm water treatment; dry weather flow water treatment; the monitoring of flows from storm sewers, gutters, and surface drains; and the pumping of town lake water for discharge into the creek at upstream points. Land use and development plans for the area are also being considered. (See also W76-11257) (Kreager-FIRL)
W76-11662

SOURCES AND POTENTIAL USES OF SALVAGEABLE WATERS IN ARIZONA URBAN REGIONS,
Arizona Water Resources Research Center, Tucson.
K. J. DeCook.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 310-319. 5 tab, 12 ref.

Descriptors: *Water reuse, *Reclaimed water, *Water management(Applied), *Cities, *Deserts, Groundwater recharge, Floodproofing, Surface waters, Irrigation, Sewage treatment, Fertilizers, Nutrients, Nitrogen, Industrial wastes, Recreation facilities, *Arizona.

Symbiotic relationships which are implicit in the occurrence and potential use of salvageable waters in the desert urban environments of Phoenix and Tucson, Arizona are discussed. Treated sewage effluent can be used for crop irrigation and as a source of nitrogen for cropped lands. Satellite waste water treatment plants located in urban regional parks can relieve local overloading of the sewage collection systems and simultaneously provide a source of usable water to supplement park water requirements. Power plant blowdown can be used for groundwater recharge and irrigation of landscaped areas. The diversion of short-term peak flood flows from small urban watersheds can reduce flood danger as well as the construction cost of hydraulic structures downstream while providing supplementary water supplies for turf irrigation or recreation parks adjoining the watercourse. (See also W76-11257) (Kreager-FIRL)
W76-11663

AN EVALUATION OF THE APPLICABILITY OF PYROLYSIS-GAS-LIQUID CHROMATOGRAPHY FOR THE IDENTIFICATION OF MICROORGANISMS IN WATER AND SEWAGE TREATMENT PLANT EFFLUENTS,
National Bureau of Standards, Washington, D. C. Center for Building Technology.
For primary bibliographic entry see Field 5A.
W76-11664

EVALUATION OF TOXICITIES AND ENVIRONMENTAL IMPACT IN 'SYMBIOTIC' WATER REUSE SYSTEMS,
M. P. Kraus.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 476-482. 6 tab, 4 ref.

Descriptors: *Viruses, *Toxicity, *Waste water treatment, *Water reuse, *Reclaimed water, *Bioassay, Sewage, Sludge, Irrigation, Oxidation lagoons, Sludge disposal, Sludge treatment, Radiation, Waste treatment, *Pollutant identification, Algae.

Viral assay data for various symbiotic water reuse systems are reviewed. Assays of water samples from a variety of oxidation lagoons revealed great variations in virus counts, with zero counts almost never being observed. Studies of soil treatment of dairy barn wastes showed appreciable virus removals, though the condition of the removed viruses was not determined. Considerable alteration in virus population was observed as a result of spray irrigation of domestic sewage onto woodland, with host-range, plaque-morphology patterns being significantly different than those of sewage samples. Viruses were found to abound in sludge disposed of on land, including digested or heat-treated sludge. The use of ionizing radiation for destroying viruses in sludges, treated sewage, and lagooned wastes suitable for use in certain chemical processes was also investigated, and it appears possible to regulate doses so that satisfactory treatment can be provided in some cases. However, certain strains of bluegreen algae carrying latent viruses have not proved inducible and remain very resistant to large doses of radiation. (See also W76-11257) (Kreager-FIRL)
W76-11665

DEVELOPMENT OF INSTRUMENTATION FOR A WATER PROCESSING ELEMENT,
Life Systems, Inc., Cleveland, Ohio.
G. G. See, P. Y. Yang, and R. A. Wynveen.
In: 3rd National Conference on Complete WateReuse June 27-30, 1976, Cincinnati, Ohio, p 491-501. 15 fig, 4 tab, 5 ref.

Descriptors: *Waste water treatment, *Water reuse, *Desalination, *Instrumentation, *Equipment, Reverse osmosis, Ozone, Chlorination, Oxidation, Filtration, Ion exchange, Design criteria, Potable water, Brackish water, Monitoring, Control systems.

A water processing element designed for use with transportable Army hospital is described, with particular emphasis on the instrumentation aspects of the system. The water processing element is capable of treating and disposing hospital waste water, producing water for reuse from waste water, and desalting brackish water for potable uses. The unit consists of six separate processes with control and monitoring instrumentation: equalization/prescreening, ultrafiltration, ion exchange, reverse osmosis, ozone oxidation, and hypochlorination. A discussion of instrumentation developments and approaches to the design of instrumentation is presented along with an example of the detailed instrumentation design of the ozone oxidation unit process. (See also W76-11257) (Kreager-FIRL)
W76-11666

IRRIGATION OF LEASED FARMLAND WITH TREATED WASTEWATER,
Hickok (Eugene A) and Associates, Wayzata, Minn.
N. C. Wenck, M. C. Hannaman, and R. F. Roskopf.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 578-593. 13 fig, 13 tab.

Descriptors: *Water reuse, *Waste water, *Irrigation, Farms, *Recycling, Crop production, Groundwater, Water quality, Water conservation, Odor, Evaluation, Chlorides.

The results from a one-year pilot study involving the irrigation of farmland with treated waste water are presented. A total of 8.2 inches of waste water was applied to the study site in six different irrigation runs, and crop samples were obtained from both irrigated and nonirrigated areas. The irrigation resulted in an increase in corn yield of 28 bushes/acre. Based on soil moisture and consumption use data, a design application rate of 12 inches/year appears feasible.The irrigation did not affect groundwater levels in the area; and with the exception of chlorides, no changes in groundwater quality were detected. Chloride contamination did not appear to be serious. No complaints of odor were received from surrounding residents during the irrigation season. (See also W76-11257) (Kreager-FIRL)
W76-11667

BENEFICIAL USE OF INDUSTRIAL WASTES IN MUNICIPAL WASTEWATER TREATMENT PLANTS,
Greeley and Hansen, Chicago, Ill.
T. E. Wilson.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 594-598. 3 fig, 3 tab, 14 ref.

Descriptors: *Industrial wastes, *Waste water treatment, *Organic compounds, *Metals, *Acids, Sludge treatment, Suspended solids, Biochemical oxygen demand, Heavy metals, Biological treatment, Denitrification, Chemical oxygen demand, Nitrogen, Byproducts, Treatment facilities, Phosphorus.
Identifiers: Municipal-industrial wastes.

Industrial wastes which can be used for beneficial purpose in municipal waste water treatment plants are discussed. Metal-acid wastes from industrial operations can be used for phosphorus removal, sludge conditioning, and a general improvement in suspended solids removal and biochemical oxygen demand removal in municipal waste water treatment operations. In general, the metal-acid waste should have a relatively high iron or aluminum content (about 5 and 2.5%, respectively). High concentrations of heavy metals in metal-acid wastes, however, may render these wastes unsuitable for the above purposes. High strength organic industrial wastes can be used to replace expensive raw chemicals used in biological denitrification processes. The organic waste should be preferably concentrated, with a soluble chemical oxygen demand as high as possible (over 50,000 mg/liter). The organic waste must also contain very little nitrogen. Specific examples of the use of each type of waste in waste water treatment applications are cited. (See also W76-11257) (Kreager-FIRL)
W76-11668

IRRIGATION WITH CITRUS WASTE WATER,
Agricultural Research and Education Center, Lake Alfred, Fla.
R. C. J. Koo.
The Citrus Industry, Vol. 55, No. 5, p 12, 17-19, May, 1974. 3 tab, 8 ref. OWRT A-016-FLA (4)

Descriptors: *Waste water treatment, *Industrial wastes, *Food processing industry, Citrus fruits, Irrigation, Waste water disposal, Agriculture, Fertilization, Nitrogen, Biochemical oxygen demand, Water reuse, *Florida.

To test the effects of citrus processing plant waste water on citrus trees several citrus scion-rootstock combinations were grown in a greenhouse for three years with treated waste water from two citrus processing plants in central Florida. No harmful effects were observed from the use of treated citrus waste water. Supplemental fertilization was required to sustain the trees, as the treated citrus waste water was low in nutrients. Observations of young and mature citrus trees irrigated with untreated waste water under field conditions indicated that quantity was more critical than quality of the waste water applied. Cultural practices in the grove should be modified to compensate for the change from a natural environ-

ment. Soil in the citrus grove serves as a filtering system for the waste water. A marked reduction in the BOD, COD, and N contents were observed as the waste water percolated through the soil profile. The results were similar to those obtained by the aeration of citrus waste water. (Murphy-FIRL)
W76-11699

WATER RECLAMATION: TECHNOLOGY AND PUBLIC ACCEPTANCE,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.
R. Stone.
Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 102, No. EE3, Proceedings paper No. 12193, p 581-594, June 1976. 7 fig, 4 tab, 3 ref. OWRT C-4030(9007)(2).

Descriptors: *Economic analysis, Environmental engineering, *Public health, *Water pollution, *Water quality, *Reclamation, *Water treatment, Regulation, Waste water(Pollution), Water resources, Water supply, Cost-benefit analysis, Mathematical models, California, Social aspects, Feasibility, *Waste water treatment, Technology, *Water reuse, *Attitudes.

The social, economic, and technical practicability of wastewater reclamation was investigated for domestic agricultural, irrigational, recreational, and industrial reuses. Attitudes of the public in 10 Southern California case study communities towards wastewater reuse were obtained by a random sample of 1,000 households from each community, and socioeconomic correlates of these attitudes were ascertained. The attitudes of public officials concerned with water resources and experts in the field of water resources management and planning were assessed on a nationwide level; and the attitudes of industrial managers towards reclaiming wastewater were ascertained on a local (southern California) level. The influence of local potable water quality parameters in affecting attitudes toward reuse was analyzed. Public health and other technical aspects of reclaiming wastewater were determined. Recommended treatment methods for various reuses were given. A cost-benefit model was presented that can determine the overall socioeconomic feasibility of reclaiming wastewater for a variety of alternative uses, taking into account differing local constraints likely to be encountered. (Bell-Cornell)
W76-11705

REGIONAL PLANNING FOR LAND DISPOSAL OF WASTEWATER,
Missouri Univ., St. Louis.
R. E. Markland, L. D. Smith, and J. D. Becker.
Water Resources Bulletin, Vol. 12, No. 3, p 577-599, June 1976. 2 fig, 3 tab, 15 ref. OWRT C-5302(No. 4221)(2).

Descriptors: *Planning, *Land management, *Disposal, *Waste water(Pollution), *Treatment facilities, Construction costs, Operating costs, Tangible benefits, Land use, Sites, Decision making, Methodology, Water policy, Simulation analysis, Optimization, Constraints, Linear programming, Computer programs, Design, Equations, Systems analysis, Mathematical models, Regional analysis.
Identifiers: *Mixed integer programming, Municipal waste water, St. Louis(Mo.), Cost minimization, *Regional planning, Data base, *Land disposal.

Described is the development and use of a mixed integer programming model for the planning of land disposal wastewater treatment facilities. Consideration is given to relevant construction and operating costs for land sites, tansmission arteries, land acquisition costs, tangible benefits from land use, controls on aquifers, and various other engineering and technical constraints. The model is used to determine which land disposal sites should serve which treatment plants, when initial construction should be initiated and completed, and when capacity expansion should occur. The model's application to the St. Louis Standard Metropolitan Statistical area is illustrated and discussed. The plan developed by application of the model is one which minimizes the discounted present value of relevant construction and operating costs, net of tangible ongoing benefits and net of the anticipated change in land value at the developed sites. (Bell-Cornell)
W76-11706

EVALUATION OF SOIL SYSTEMS FOR LAND DISPOSAL OF INDUSTRIAL AND MUNICIPAL EFFLUENTS,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
B. L. Carlile, and J. A. Phillips.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-257 093, $5.00 in paper copy, $3.00 in microfiche. North Carolina WateResources Research Institute, Raleigh, UNC-WRRI Rpt. No. 118 July 1976. 63 p, 5 fig, 22 tab, 44 ref, 2 append. OWRT A-071-NC (2) 14-31-0001-5033.

Descriptors: *Waste water disposal, *Municipal wastes, *Industrial wastes, *Design criteria, Irrigation, Nutrients, Nitrogen, Salts, Heavy metals, Soil drainage, Vegetative cover, Hydraulics, Soil classification, Waste water treatment, Waste disposal, *North Carolina, Organic wastes.
Identifiers: *Land application, *Land disposal, Coastal Plain soil(NC).

The suitability of soils of North Carolina for application of industrial and municipal wastes was studied. In the Coastal Plain soil resource area, soil drainage is the most critical physical parameter in determining suitability of field sites for waste applications. Of the seven field sites investigated, five were located in the Coastal Plain soil resource area and two in the Piedmont soil resource area. Design loadings which can be utilized at these sites varied considerably, including hydraulic loadings of one inch per week on the Piedmont sites and up to four inches per week on the rapidly drained sands of the Coastal Plain. Organic loadings which could be successfully utilized on each site ranged from about 1100 lb/a/wk to about 4000 lb/a/wk total oxygen demanding material, again with the lower rates required on the Piedmont soils. Of the sites investigated, salt problems were responsible for more operational problems than any other design parameter. Wastewater containing up to 500 mg/l of sodium ions can be successfully applied on most field sites if either proper balances of Ca + Mg are maintained in the water or by application of soil amendments to the field. Total salt loads of up to 3000 mg/l can be applied to fescue pastures without restricting plant growth. If the above parameters as well as nutrient and heavy metal loadings are balanced to site capabilities and if sound management practices of the soil-crop, irrigation, and other operational functions followed, land application of wastewater can be a technically and economically sound system for treating waste loads at many industrial and municipal sites in North Carolina.
W76-11774

OVERLAND FLOW PRETREATMENT OF WASTEWATER,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
M. R. Overcash, D. M. Covil, J. W. Gilliam, P. W. Westerman, and F. J. Humenik.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-257 143. $6.75 in paper copy, $3.00 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Rpt. No. 117, July 1976. 140 p, 16 fig, 36 tab, 51 ref. OWRT B-067-NC (2) 14-31-0001-4113

Descriptors: *Overland flow, *Pre-treatment(Water), *Nutrient removal, *Waste water treatment, *Waste treatment, Municipal wastes, Industrial wastes, *Nitrogen, Nutrients, Recycling, Farm wastes, Poultry, Agricultural runoff, Path of pollutants, Nitrification, Denitrification, Nitrates, Southeast U.S.
Identifiers: Agricultural wastes, Poultry wastes, Nutrient loading, Hydraulic loading.

Overland flow (OLF) as a pretreatment process for wastewater was studied in a three part approach: (1) an assessment of established treatment mechanisms and literature data to rank the potential uses of the OLF process for municipal, industrial, and agricultural wastes according to advantageous usage in the Southeast; (2) experimental research into nitrogen transformations occurring in OLF for poultry manure; and (3) the scale-up application of research and project results to a farm animal production level. With regard to municipal wastes, OLF was estimated to be most advantageous when used to replace secondary treatment followed by direct stream discharge or by advanced treatment. Benefits were also derived when OLF was used as secondary treatment prior to terminal land application. The OLF study of nitrogen transformations for poultry manure indicated the largest N pathway was the unaccounted for losses which include nitrification-denitrification and ammonia volatilization (50-70 percent of influent N). Grass uptake was 5-20 percent, and conversion to nitrate in the effluent liquid was 5-10 percent of the influent N. The smallest pathways (1-3 percent) were the soil-water percolation beyond 2.4 m depth and rainfall runoff losses. Similar levels of total N losses were achieved for 1670 kgN/ha./yr and 2970 kgN/ha./yr; for hydraulic loadings of 4/cm/week and 7.6 cm/week; and for rest periods of 22 hours and 46 hours. Nitrogen losses increased from 50-65 percent after 15 m of flow to 70-80 percent after 30 m of flow distance. Increased rest periods and lower waste application rates favored larger nitrification potential. (Stewart-North Carolina State)
W76-11775

REMOVAL OF UNDESIRABLE CATIONS FROM ACID MINE WATER BY A NEW CATION-EXCHANGE MATERIAL,
West Virginia Univ., Morgantown. Water Research Inst.
J. H. Strohl, and J. L. Hern.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-257 092, $3.50 in paper copy, $3.00 in microfiche. Information Report 9, 1976. 14 p, 6 fig, 3 tab, 2 ref. OWRT A-030-WVA(1), 14-34-0001-6051.

Descriptors: *Acid mine water, *Cation exchange, *Electrode, *Waste water treatment, *Water treatment, Chelation, Chemical analysis, Cost, Demineralization, Ion exchange, Mine acids, Mine water, Treatment, Water pollution, Water quality.
Identifiers: Cation exchange medium, Graphite, Electrogeneration, Metal-ion pollutants, Sulfonated graphite.

This study is directed toward the development of material and methods useful for removing metal-ion pollutants from water. Several modified graphites were prepared that had ion-exchange or chelating properties capable of removing Fe(+3), Ni(+2), Co(+2), Mg(+2), and Ca(+2) from water. The absorption capacities of these modified graphites are too low for economical use in water treatment. They are useful for analytical separations, however. Attempts at producing materials with higher absorption capacities were unsuccessful. Adjustment of pH and removal of some metal ions as the hydroxides by the electrogeneration of base appear to be a practical process for large-scale water treatment.
W76-11776

ENVIRONMENTAL IMPACT ASSESSMENT, WATER QUALITY ANALYSIS, YADKIN - PEE DEE RIVER BASIN,
TRW, Inc. Redondo Beach, California.
For primary bibliographic entry see Field 5G.
W76-11781

WATER POLLUTION CONTROL ACT OF 1972, ENVIRONMENTAL IMPACT ASSESSMENT, POTOMAC RIVER.
Academy of Natural Sciences, Philadelphia, Pa.
For primary bibliographic entry see Field 5G.
W76-11782

WATER QUALITY ANALYSIS, SNAKE RIVER, IDAHO.
Tetra Tech, Inc., Lafayette, Calif.
For primary bibliographic entry see Field 5G.
W76-11783

WATER POLLUTION CONTROL ACT OF 1972, ENVIRONMENTAL IMPACT ASSESSMENT, SNAKE RIVER.
Parametrix, Inc., Seattle, Wash.
For primary bibliographic entry see Field 5G.
W76-11784

WATER QUALITY ANALYSIS, UPPER RIO GRANDE.
Water Resources Engineers, Inc., Austin, Tex.
For primary bibliographic entry see Field 5G.
W76-11785

WATER POLLUTION CONTROL ACT OF 1972, ENVIRONMENTAL IMPACT ASSESSMENT, IOWA-CEDAR RIVER BASIN.
Midwest Research Inst., Minneapolis, Minn. North Star Research Div.
For primary bibliographic entry see Field 5G.
W76-11786

ENVIRONMENTAL IMPACT ASSESSMENT, WATER QUALITY ANALYSIS, J. PERCY PRIEST RESERVOIR.
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 5G.
W76-11787

ENVIRONMENTAL IMPACT ASSESSMENT, WATER QUALITY ANALYSIS, UTAH LAKE - JORDAN RIVER BASIN.
Environmental Dynamics, Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 5G.
W76-11788

ENVIRONMENTAL IMPACT ASSESSMENT, WATER QUALITY ANALYSIS, LOWER MISSOURI RIVER BASIN.
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5G.
W76-11790

WATER POLLUTION CONTROL ACT OF 1972, ENVIRONMENTAL IMPACT ASSESSMENT, UPPER MISSISSIPPI RIVER BASIN,
Midwest Research Inst., Minneapolis, Minn. North Star Research Div.
For primary bibliographic entry see Field 5G.
W76-11791

WATER PURIFICATION APPARATUS,
F. G. Mayer.
U.S. Patent No. 3,957,589, 4 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 946, No 3, p 1214, May 18, 1976.

Descriptors: *Patents, *Water purification, *Water treatmcnt, *Distillation, *Water pollution treatment, Water quality control, *Condensation, Steam, Cooling, Equipment condensers, *Waste water treatment.

A water purifying apparatus has an inner chamber to be filled with contaminated water which is heated by a heating unit to a point where water vapor or steam is created. The steam is evacuated from the chamber at its upper portion and passes downward in contact with a condensing wall having cooling vanes on its exterior into a trough provided near the base of the apparatus. Water is drained off into a container located below the chamber. A cover surrounds the cooling vanes forming an annular air passage and is so constructed that open areas exist near the base of the cover. The cover has an aperture on top and a fan is placed below the aperture. Cooling air is carried from the open areas near the base of the apparatus upward over the vanes and to the aperture at the top where it is continuously evacuated. With this structure the vanes are continuously cooled without affecting the heating operation in the chamber itself. Pure water is obtained from the condensed steam in a rapid and efficient manner. (Sinha-OEIS)
W76-11832

WASTE-WATER PURIFICATION,
Sterling Drug Inc., New York. (Assignee).
P. V. Knopp, and W. B. Gitchel.
U.S. Patent No. 3,957,632, 6 p, 2 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 946, No 3, p 1227, May 18, 1976.

Descriptors: *Patents, *Waste water treatment, Water pollution treatment, *Sewage treatment, Organic wastes, Adsorption, *Activated carbon, Oxygen, Nitrification, *Denitrification, *Activated sludge, Anaerobic conditions.

The process of simultaneous removal of organic carbonaceous material and biological oxidation of the reduced nitrogenous forms in waste-waters followed by subsequent reduction of the oxidized nitrogen to elemental nitrogen is comprised of the following steps: waste-water containing ammoniacal nitrogen is fed into a vessel containing a developing active biomass having a sludge age of at least about three days; an aqueous suspension of powdered activated carbon is introduced simultaneously with the addition of a non-condensible oxygen containing gas; aerobic conditions are maintained for at least one hour to substantially oxidize ammoniacal nitrogen to nitrite or nitrate nitrogen; the powdered activated carbon, associated adsorbed organic material and biological solids are settled and separated and returned to the inlet end; the liquid phase is passed to an anaerobic zone containing denitrifying organisms to which further powdered activated carbon and organic carbon is added so that oxidized nitrogen forms are reduced to elemental nitrogen and solids accumulate; the mixture is passed to a quiescent zone where the powdered activated carbon and associated organic material are substantially removed from the wastewater; and the effluent is removed. (Sinha-OEIS)
W76-11834

SEWAGE TREATMENT METHOD AND APPARATUS,
ITT Industries, Inc., New York. (Assignee).
G. Gatti, and H. Fries.
U.S. Patent No. 3,957,633, 4 p, 3 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 946, No 3, p 1228, May 18, 1976.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, Water pollution treatment, *Aeration, Pumps, Pumping plants, Conduits, Equipment, Flow.

A method and apparatus is provided for aerating sewage water in a tank, such as a sewage water pump station. A pump is mounted in the tank with its inlet submerged in the sewage water. A conduit is connected to the outlet of the pump for providing flow communication between the pump and an outlet pipe of the tank. Sewage aeration is provided in the conduit. This aeration includes an air intake pipe which has an inlet outside of the tank allowing air to be drawn into the conduit. The conduit includes means for directing the flow of sewage water from the pump through the aeration means back into the tank. In addition, such means is shiftable to a position allowing flow of sewage water from the tank to the outlet pipe for transport to an additional pump station. As a consequence, a single pump is utilized for both aerating the sewage water and transporting it from one station to the next. (Sinha-OEIS)
W76-11835

SPHINCTER CONE ASSEMBLY FOR PURIFYING WATER,
For primary bibliographic entry see Field 5F.
W76-11839

SOME ASPECTS OF MODELLING THE LONG-TERM BEHAVIOUR OF AQUATIC ECOSYSTEMS,
Technical Univ. of Denmark, Lyngby. Inst. of Mathematical Statistics and Operations Research.
For primary bibliographic entry see Field 5B.
W76-11883

AN ECOLOGICAL MODEL FOR HEAVY METAL CONTAMINATION OF CROPS AND GROUND WATER,
Royal Danish School of Pharmacy, Copenhagen.
For primary bibliographic entry see Field 5B.
W76-11885

CITY--INDUSTRY TEAMWORK SOLVES CRITICAL WASTEWATER PROBLEM,
For primary bibliographic entry see Field 5G.
W76-11891

THE SEPTIC TANK--A METHOD OF SEWAGE DISPOSAL FOR PRIVATE OR PUBLIC BUILDINGS,
Arizona State Dept. of Health Services, Phoenix.
Engineering Bulletin No 12, June 1971. 22 p, 6 plates, 3 tab.

Descriptors: *Arizona, *Septic tanks, *Legislation, *Design standards, *Sewerage, Sewage disposal, Waste disposal, Sewage treatment, Wastes, Disposal, Environmental sanitation, Sanitary engineering, Specifications, Structural design, Administration, Regulation, Maintenance, Operation and maintenance, Sewage sludge, Leaching, Digestion, Treatment facilities.

This bulletin sets forth the applicable standards for septic tank construction in Arizona. The principles governing the operation of septic tanks are discussed to acquaint interested persons with the need and purposes behind the standards. Before any septic tank construction may begin, approval of the design and installation of the septic tank disposal system is necessary. Site conditions and percolation tests are important considerations influencing approval. Once the system is approved, certain specifications must be followed in the design and construction of the septic tanks. The types of leaching systems which can be used are also discussed. Once the system is ready for service, the digestion process will begin automatically with the introduction of suitable bacteria. After operation begins, the accumulated sludge and scum in the system should be cleaned out regularly. (Hadoulias-Florida)
W76-11892

MINIMUM REQUIREMENTS FOR DESIGN, SUBMISSION OF PLANS AND SPECIFICATIONS OF SEWAGE WORKS.
Arizona State Dept. of Health Services, Phoenix.
Arizona State Department of Health Engineering Bulletin No 11, September 1970. 43 p.

Descriptors: Facilities, *Legislation, *Design standards, *Arizona, *Sewage treatment, Sewage disposal, Waste disposal, Wastes, Sewerage, Sewers, Disposal, Environmental sanitation, Sanitary engineering, Sewage sludge, Pumping plants, Sludge, Primary treatment, Secondary treatment, Sewage sludge treatment, Structural design, Construction, Administration, Specifications, Regulation, *Treatment facilities.

The Arizona State Board of Health has promulgated rules and regulations governing the design, construction and operation of sewerage systems and waste treatment works. This bulletin is intended to serve as a guideline to those rules, and to inform those persons designing and submitting plans for sewerage and industrial waste collection treatment and disposal systems. The bulletin sets forth the minimum standards acceptable for plans and specifications submitted to the State Department of Health. The guidelines include a description of the types of factual data that must be included in the plans submitted for approval. The design structures which must be included in sewer systems and sewerage pumping stations are set forth along with specifications for plant layouts, plant detail, plant facilities, and construction. Also set forth are procedures relating to various treatment methods including primary, secondary, sludge digestion and disposal, disinfection, odor control and stabilization ponds. If the standards contained in this bulletin are followed, compliance with the pertinent rules and regulations will be assured. (Hadoulias-Florida)
W76-11893

INTERIM REPORT, COOPERATIVE GRAYS HARBOR SURVEILLANCE PROGRAM-1970,
Washington State Dept. of Ecology, Olympia. Office of Technical Services.
R. K. Cunningham.
Olympia, Washington (June 1971). 32 p, 11 fig, 3 tab, 3 append.

Descriptors: *Washington, *Biochemical oxygen demand, *Dissolved oxygen, *Pulp wastes, *Fishkill, Oxygen sag, Chemical wastes, Industrial wastes, Water pollution sources, Water pollution effects, Water pollution treatment, Water quality control, Water quality standards, Data collections.
Identifiers: Hazardous substances.

Because of a history of low dissolved oxygen (DO) concentrations in Grays Harbor, Washington, the State Department of Ecology has required local pulp industries to improve waste treatment facilities. A study was also commissioned to determine the DO concentrations before and after utilization of the facilities. This report concentrates on the 'before' studies in 1970. The results show that during the summer and fall of 1970 DO concentration was low, being substandard for all but six days during August, September and October. During most of the period a high correlation existed between the exerted BOD and the harbor's DO response. Many times during the low flow period when sampling was done the total discharged BOD exceeded 150,000 to 200,000 pounds per day. Since the new treatment facilities are intended to reduce the discharge to 80,000 pounds per day, calculations indicate that an average daily reduction of 38,000 pounds would result, with an expected measureable increase in DO. (Comer-Florida)
W76-11894

ACTINOMYCETES OF SEWAGE-TREATMENT PLANTS,
Rutgers - The State Univ., New Brunswick, N.J. Waksman Inst. of Microbiology.
H. A. Lechevalier.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-245 914, $4.50 in paper copy, $3.00 in microfiche. Environmental Protection Agency, Environmental Protection Technology Studies Series No. EPA-600/2-75-031, September 1975. 62 p, 23 tab, 19 ref. R-802003.

Descriptors: *Actinomycetes, *Sewage treatment, *Activated sludge, *Aeration, *Waste water treatment, *Pollution abatement, Water pollution, Microbiology, Foaming, Water quality control.
Identifiers: Nocardia amarae.

In some sewage-treatment plants of the activated sludge type, a thick foam may be formed at the surface of the secondary aeration and settling tanks. Such foams have often been found to be rich in actinomycetes. This report covers the work done on this problem between April 1971 and May 1974. Over 250 strains of actinomycetes have been isolated from foams or activated sludge from 19 different sewage-treatment plants located in 8 states. The actinomycete most commonly associated with foams is a previously undescribed Nocardia which has been given the name N. amarae. It has been demonstrated experimentally in the laboratory that N. amarae may cause the kind of foam observed in the plants. Factors affecting the growth of N. amarae have been studied and a method was proposed for control of the foam by addition of digester supernatant to the activated sludge. (Sinha-OEIS)
W76-11927

SURVEY STUDY OF TECHNIQUES TO PREVENT OR REDUCE DISCHARGES OF HAZARDOUS CHEMICALS,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5G.
W76-11931

PRELIMINARY RESULTS WITH A PILOT PLANT - WASTE RECYCLING MARINE-AQUACULTURE SYSTEM,
Woods Hole Oceanographic Institution, Mass.
J. H. Ryther.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-247 182, $4.50 in paper copy, $3.00 in microfiche. Technical Report No. WHOI-75-41, September 1975. 31 p, 11 fig, 5 tab, 6 ref. 04-4-158-5; 04-5-158.

Descriptors: *Aquiculture, *Recycling, *Pilot plants, *Shellfish farming, *Fish farming, *Sewage effluent, *Pollution abatement, Algae, Waste water disposal, Mollusks, Fish, Water reuse.
Identifiers: Seaweeds.

A combined waste recycling-marine aquaculture system capable of complete nitrogen removal from treated domestic wastewater was developed and tested on a pilot-plant scale over a one-year period. Effluent from secondary sewage treatment, mixed with seawater was used to grow unicellular marine algae in large, continuos-flow, outdoor mass cultures. Harvest from the algae cultures was fed to oysters and other filter-feeding bivalve molluscs and to secondary crops of flounder or lobsters. Dissolved wastes produced by the animals were assimilated by cultures of commercially-valuable seaweeds. Successful cultures of unicellular algae, mostly diatoms, and seaweeds were sustained over long periods of time (months) with only minor problems. Algal yields and nitrogen removal capacity varied seasonally by 3-4 fold and were controlled by solar radiation but not by temperature. Assuming that problems with shellfish culture can be resolved, a combined unicellular algae-shellfish-seaweed system is capable of complete nitrogen removal from wastewater effluent within an area of 48 acres and with an estimated annual production of 183 tons of oyster meat, 3,350 tons wet weight of seaweeds and undetermined quantities of flounder and/or lobsters per MGD effluent treated (wastes per 10,000 capita). A seaweed system alone is capable of nitrogen removal in an area of 60 acres with annual production of 16,300 tons wet weight of seaweeds. (Sinha-OEIS)
W76-11932

A STUDY OF THE EFFECTS OF DETERGENTS ON TYPICAL BILGE WATERS AND CORRELATION OF OIL PARTICLE SIZES,
General Electric Co., Philadelphia, Pa. Re-Entry and Environmental Systems Div.
For primary bibliographic entry see Field 5C.
W76-11939

RECHARGE OF RECLAIMED WASTE WATER: RESEARCH NEEDS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
In: Proceedings, Tenth Biennial Conference on Ground Water, September 11-12, 1975. Ventura, California, p 76-87. 2 tab, 35 ref. OWRT B-146-TEX(3).

Descriptors: *Reclaimed water, *Recharge, *Water reuse, Water chemistry, *Trace elements, Arsenic, Cadmium, Chromium, Copper, Iron, Mercury, Manganese, Nickle, Lead, Selenium, Strontium, Zinc, *Activated sludge, *Nitrification, Texas, California, Research priorities, *Waste water treatment, Metals.
Identifiers: Carcinogenic compounds, Tumorigenic agents, Nitrifying bacteria, Heterotrophic bacteria, Dallas(Tex), Trace metals.

Certain compounds and metals have been observed to demonstrate carcinogenic properties. Recognition that factors in the environment could be responsible for the initiation of tumors could incriminate both food and water as major sources of environmental tumorigenic substances. Trace metals contained in reclaimed waste water are among the substances under study. A study was done at Dallas, Texas examining metal removal by various advanced waste treatment (AWT) processes. The basic biological process used was nitrifying an activated sludge system. Metal removal is enhanced by a nitrifying system and fewer bacterial viruses are also present. The nitrified operation has a much more immediate role in the recharge situation. The amount of dilution waters presently required could be substantially reduced by conversion of waste treatment plants to highly nitrified operations. (Heiss-NWWA)
W76-11959

EFFLUENT LIMITATIONS GUIDELINES FOR EXISTING SOURCES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS FOR NEW SOURCES FOR THE PAVING AND ROOFING MATERIALS (TARS AND ASPHALT) POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11989

INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY.
Environmental Protection Agency,Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11992

OFFSHORE SEGMENT OF THE OIL AND GAS EXTRACTION POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11994

RECYCLE--REUSE, INFALL--OUTFALL, DECISIONS CONFRONT SCIENCE, PUBLIC,
Central and Southern Florida Flood Control District, West Palm Beach.
J. Browning.
In Depth Report, Vol 1, No 6, p 1-12, June 1972. 12 p, 1 fig, 3 tab.

Descriptors: *Water districts, *Recycling, *Waste storage, *Waste treatment, *Aquifers, Activated sludge, Aeration, Tertiary treatment, Geologic formations, Wastewater treatment, Freshwater, Water pollution treatment, Groundwater, Groundwater resources, *Water reuse.

Set forth in this guide book is background material designed to help the atechnical person understand the difference between recycling and reuse and the problem of continuous ocean waste discharge. Also described is the use of models for predicting seawater encroachment on freshwater aquifers. New methods of wastewater treatment include injection into deep, unused geologic formations, extended aeration, and activated sludge processes. Secondary processes may not kill viruses in wastewater, and, therefore, tertiary processes may be required. Tables indicate constituent removals by various wastewater reclamation projects as well as costs for each. Decision must be made as to the future course of wastewater treatment, since society may not be willing to bear the cost of 100% pollution free water. (Frank-Florida)
W76-12001

POLLUTION CONTROL IN MEAT, POULTRY AND SEAFOOD PROCESSING,
H. R. Jones.
Noyes Data Corporation: Park Ridge, New Jersey; London, England. 1974. 263 p, Pr. $36.00.

Descriptors: *Food processing industry, *Poultry, *Pollution abatement, Water pollution control, *Waste water treatment, *Industrial wastes, Biodegradation, Patents, Air pollution, Odor, Nitrogen.
Identifiers: *Seafood processing, *Meat processing.

This book deals primarily with wastewater treatment and pollution reduction for the meat processing, the poultry processing and the seafood processing industries. Animal slaughtering and meat processing produce a highly loaded, but biologically degradable, wastewater containing dissolved suspended and dispersed fibrous animal matter with high nitrogen content. It also creates serious air pollution and odor removal problems. Poultry and seafood wastes have similar problems. Condensed data from government sources are coordinated and important pollution removal processes are interpreted and explained by examples from recent USA patents. The table of contents serves as a subject index and bibliographies are included with each section. A special section is devoted to future trends and recommendations. Other indexes by company, inventor and patent number help to provide access to the information.--Copyright 1974, Biological Abstracts, Inc.
W76-12146

DESIGNING POST-CHLORINATION BY CHEMICAL REACTOR APPROACH,
Southern Illinois Univ., Edwardsville. Dept. of Urban and Environmental Engineering.
P. Kokoropoulos.
J Water Pollut Control Fed. 45(10); p 2155-2165, 2241, 1973.

Descriptors: *Chlorination, *Waste water treatment, *Water treatment, *Treatment facilities, Design, Bacteria, Disinfection.
Identifiers: *Post-chlorination, *Chemical reactors.

Chemical reaction engineering concepts can be applied in the analysis and design of post-chlorination facilities. The post-chlorination process can be considered as a multicomponent, open system, where several parallel, competing reactions occur simultaneously but at different rates. The proposed design is a multiple-reactor system of backmix stages in series. The number of stages and the holding times are chosen so that the system approaches plug-flow conditions. Calculations show that multiple backmix reactor systems exhibit high conversion efficiencies (99.9% bacterial kill), at reasonable holding times and are readily amenable to expansion by additional stages. Typical examples of application of the design in post-chlorination are given.--Copyright 1974, Biological Abstracts, Inc.
W76-12150

5E. Ultimate Disposal Of Wastes

THE ENVIRONMENTAL AND SOCIOLOGICAL IMPACT OF RECYCLING OF AGRICULTURAL WASTE BY LAND USE,
Green Valley Farms, Avondale, Pa.
For primary bibliographic entry see Field 5D.
W76-11641

EXPERIENCE WITH LAND APPLICATION OF WASTEWATER AND STATE REGULATIONS - THE PENNYPACK WATERSHED,
Martin (A. W.) Associates, Inc., King of Prussia, Pa.
For primary bibliographic entry see Field 5D.
W76-11642

EXPERIENCE WITH LAND APPLICATION OF WASTEWATER AND STATE REGULATIONS - PENNYPACK WATERSHED-PENNSYLVANIA,
Pennypack Watershed Association, Bryn Athyn, Pa.
For primary bibliographic entry see Field 5D.
W76-11643

LAND DISPOSAL OF WASTEWATER IN THE COMMONWEALTH OF PENNSYLVANIA - A REGULATORY VIEW,
Pennsylvania Department of Environmental Resources, Harrisburg. Burea of Water Quality Management.
For primary bibliographic entry see Field 5D.
W76-11644

COMPUTER AIDED PLANNING OF A REGIONAL DISPOSAL SYSTEM FOR MUNICIPAL SLUDGE,
B and P Engineers, Kitchener (Ontario).
For primary bibliographic entry see Field 5D.
W76-11647

TRANSPORT OF CONCENTRATES AND SLUDGES,
Culp, Wesner, Culp-Clean Water Consultants, El Dorado Hills, Calif.
W. F. Ettlich.
In: 3rd National Conference on Complete WateReuse, June 27-30, 1976, Cincinnati, Ohio, p 140-146. 11 fig, 3 tab.

Descriptors: *Cost comparisons, *Cost analysis, *Sludge, *Transportation, Pipelines, Railroads, Barges, Costs, Economics, Evaluation, Waste disposal.
Identifiers: Trucks.

A cost analysis of various sludge transport methods is presented. The total annual cost for the transport of dewatered sludge by railroad is less than that associated with truck transport, although railroad facilities are more capital intensive than truck facilities. Truck is the least expensive mode for liquid sludge transport over one-way distances of 20 miles or less and for sludge volumes less than 10-15 million gallons/year. Pipeline is the least expensive transport mode when the annual sludge volume is greater than approximately 30-70 million gallons, depending on distance. Pipeline is not economically attractive for annual sludge volumes of 10 million gallons or less because of the high capital investment. Rail and barge are comparable over the 7-700 million gallon volume range for long haul distances. Barge is more economical than rail for short to medium distances and for annual sludge volumes greater than 30 million gallons. (See also W76-11257) (Kreager-FIRL)
W76-11660

GROUND-WATER QUALITY AT THE SITE OF A PROPOSED DEEP-WELL INJECTION SYSTEM FOR TREATED WASTEWATER, WEST PALM BEACH, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5A.
W76-11681

IRRIGATION WITH CITRUS WASTE WATER,
Agricultural Research and Education Center, Lake Alfred, Fla.
For primary bibliographic entry see Field 5D.
W76-11699

REGIONAL PLANNING FOR LAND DISPOSAL OF WASTEWATER,
Missouri Univ., St. Louis.
For primary bibliographic entry see Field 5D.
W76-11706

EVALUATION OF SOIL SYSTEMS FOR LAND DISPOSAL OF INDUSTRIAL AND MUNICIPAL EFFLUENTS,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 5D.
W76-11774

EVALUATION OF SLUDGE DUMPING OFF DELAWARE BAY,
Delaware Univ., Lewes. Coll. of Marine Studies.
For primary bibliographic entry see Field 5B.
W76-11792

UNDERGROUND LIQUID WASTE DISPOSAL,
American Society of Civil Engineers, New York. Task Committee on Underground Liquid Disposal.
D. L. Warner.
Journal of the Hydraulics Division, American Society of Civil Engineers Proceedings, Vol. 101, No. HY3, Proceedings paper No. 11191, p 421-435, March 1975. 10 tab, 18 ref.

Descriptors: *Deep wells, *Hydraulics, *Injection wells, *Wells, Injection, Brines, Wastewater disposal, Waste water treatment, Water policy.
Identifiers: Environmental impact.

As of mid-1973, at least 278 industrial wastewater injection wells had been constructed in 24 states. Statistics concerning these wells are presented and their environmental impact appraised. A few states have specific laws and regulations concerning such wells, but most states use existing general statutes. Straight-line projections would indicate that about 614 wells will have been constructed by 1985 and 1,034 by 2000. Brine wastes are the most likely to continue to be injected in the future. It is estimated that strict interpretation of present Federal law would cause the production of more than 200 mgd of brine that would require disposal by injection or other means as compared with 24 mgd that was being injected in 1973. The policies and procedures adopted by ORSANCO are suggested as a model for others to consider. (Bell-Cornell)
W76-11888

CITY--INDUSTRY TEAMWORK SOLVES CRITICAL WASTEWATER PROBLEM,
For primary bibliographic entry see Field 5G.
W76-11891

THE SEPTIC TANK--A METHOD OF SEWAGE DISPOSAL FOR PRIVATE OR PUBLIC BUILDINGS,
Arizona State Dept. of Health Services, Phoenix.
For primary bibliographic entry see Field 5D.
W76-11892

MINIMUM REQUIREMENTS FOR DESIGN, SUBMISSION OF PLANS AND SPECIFICATIONS OF SEWAGE WORKS.
Arizona State Dept. of Health Services, Phoenix.
For primary bibliographic entry see Field 5D.
W76-11893

A STUDY OF THE EFFECTS OF DETERGENTS ON TYPICAL BILGE WATERS AND CORRELATION OF OIL PARTICLE SIZES,
General Electric Co., Philadelphia, Pa. Re-Entry and Environmental Systems Div.
For primary bibliographic entry see Field 5C.
W76-11939

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM: SEPARATE STORM SEWERS.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11993

RECYCLE--REUSE, INFALL--OUTFALL, DECISIONS CONFRONT SCIENCE, PUBLIC,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 5D.
W76-12001

ZERO DISCHARGE: NATIONAL GOAL OR NATIONAL CALAMITY,
Allied Chemical Corp., New York.
For primary bibliographic entry see Field 5G.
W76-12014

5F. Water Treatment and Quality Alteration

CONSTRUCTION SAFETY IN WATERWORKS,
Construction Safety Association of Ontario, Toronto, Ontario.
C. E. McKnight.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 321-325.

Descriptors: *Safety, *Accidents, *Construction, *Treatment facilities, *Water treatment, Education, Legislation, Organizations, Canada.
Identifiers: Ontario, Construction safety act.

Measures being taken in Ontario, Canada, to promote safety during the construction of water works are reviewed. The Construction Safety Act of 1973 governs all installation, rennovation, and repair activities except those covered by the Mining Act. The Act specifies personal protective equipment that must be worn by workers on any project that changes the physical structure or appearance of a building, equipment, or machinery. The Construction Safety Association of Ontario provides area counselors who actively promote accident prevention and develop educational programs for contractors and their employees. The Research and Development Section of the Association investigates accident causes and provides statistical information on accident occurence. (See also W76-11249) (Kreager-FIRL)
W76-11651

SAFETY IN WATER AND WASTEWATER PLANTS,
Ontario Ministry of the Environment (Toronto).
For primary bibliographic entry see Field 5G.
W76-11652

WATER PURIFICATION APPARATUS,
For primary bibliographic entry see Field 5D.
W76-11832

WATER TREATMENT DEVICE WITH TRANSITORIZED CIRCUIT,
Water Technology Service, Inc., Cleveland, Ohio. (Assignee).
H. S. Aber, D. D. Riggs, and J. Lamantia.
U.S. Patent No. 3,957,617, 4 p, 6 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 946, No 3, p 1223, May 18, 1976.

Descriptors: *Patents, *Water treatment, *Demineralization, *Hardness(Water), Water softening, Scaling, Electric currents, Electric fields.

A fluid treatment apparatus is comprised of a fitting having inlet and outlet passages for coupling in a flow line. The fitting defines an electrically conductive bell-shape housing having inlet and outlet chambers and a perforated electrically conductive screen insulatively supported between the chambers. An electric potential is applied between the electrically conductive bell-shaped housing and the electrically conductive screen. The electric field established between the screen and fitting affects the water flowing through the fitting to eliminate the mineral and other deposits already accumulated in the downstream water system and prevents further accumulation. (Sinha-OEIS)
W76-11833

SPHINCTER CONE ASSEMBLY FOR PURIFYING WATER,
B. B. Barefoot.
U. S. Patent No. 3,957,655, 3 p, 6 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 946, No 3, p 1236, May 18, 1976.

Descriptors: *Patents, *Water treatment, *Water purification, *Water pollution treatment, Water pollution control, Water quality control, Suspended solids, Turbulence, Mixing, Equipment, *Waste water treatment.
Identifiers: *Sphincter cones, Particulates.

The sphincter cone is a water treatment and clarification vessel which contains no moving parts. The return or recirculated water is introduced into the cone through the surge tank located at the top center of the cone and having an open bottom. The surge tank nullifies turbulence of the incoming water. From here the water is driven out of the bottom of the surge tank and rises upward and radially outward from the center of the cone towards the outside circumferential sump formed between the inner circular wall and the outer wall. The bottom 6 feet of the circumferential sump is pitched or inclined downward toward the outlet pipe. This construction combined with the settling velocities of the descending suspended particulate directed towards the outlet serves to very adequately remove the solids from the water. The water is then drained in its clarified state away from the cone through the outlet pipe and is then ready for recirculation or return to the sewage system or streams. Should the water require more than simple clarification, then the sphincter cone can serve as a water treatment vessel whereby the chemical additives are introduced upstream of the surge tank and through the turbulence in the surge tank, are thoroughly mixed and dispersed throughout the entire volume of water, thus resulting in uniform water treatment. (Sinha - OEIS)
W76-11839

REVIEW OF PROJECTS AFFECTING SOLE SOURCE AQUIFERS, EDWARDS UNDERGROUND RESERVOIR, TEXAS AREA; INTERIM PROJECT REVIEW GUIDELINES.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11991

DESIGNING POST-CHLORINATION BY CHEMICAL REACTOR APPROACH,
Southern Illinois Univ., Edwardsville. Dept. of Urban and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W76-12150

5G. Water Quality Control

WATER POLLUTION CONTROL: CROSSROADS OF A MUNICIPAL FINANCIAL DILEMMA,
North Texas State Univ., Denton. Dept. of Administrative Sciences and Marketing.
For primary bibliographic entry see Field 5D.
W76-11626

REMOTE CONTROL OF COMBINED SEWER OVERFLOWS,
Watermantion, Inc., Saint Paul, Minn.
For primary bibliographic entry see Field 5D.
W76-11630

EPA GUIDANCE AND POLICY ON LAND TREATMENT,
Environmental Protection Agency, Washington, D. C. Office of Water Programs.
For primary bibliographic entry see Field 5D.
W76-11638

PUBLIC HEALTH ASPECTS OF LAND APPLICATION OF WASTEWATER EFFLUENTS,
Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
For primary bibliographic entry see Field 5D.
W76-11639

EDUCATIONAL AND INFORMATIONAL NEEDS FOR ACHIEVING PUBLIC ACCEPTANCE,
Purdue Univ., Lafayette, Ind. Cooperation Extension Service.
J. O. Dunbar.
In: Land Application of Wastewater, November 20-21, 1974, Newark, Delaware, p 35-38. 3 ref.

Descriptors: *Waste water disposal, *Sludge disposal, *Recycling, *Information exchange, *Education, *Attitudes, *Waste treatment, Phychological aspects, Political aspects, Social aspects.

An educational and informational program is proposed for gaining public acceptance of the idea of recycling urban effluents and sludges to the land. The program is outlined in terms of necessary behavioral changes required, educational methods for achieving attitude changes, and means for communicating information on the subject. The program is divided into four parts corresponding to the following types of audiences: the general public, decision makers and others concerned with environment and waste treatment, people with vested interests that will be significantly affected by waste recycling, and professionals from government agencies who work closely with people affected by the decision. (See also W76-11231) (Kreager-FIRL)

W76-11640

ENVIRONMENTAL ASSESSMENT: A PLANNING TOOL,
Ontario Ministry of the Environment, Toronto. Environmental Approvals Branch.
For primary bibliographic entry see Field 6G.
W76-11649

THE GREAT LAKES AGREEMENT - A MID-TERM PERSPECTIVE,
Department of the Environment, Ottawa (Ontario). Liaison and Coordination Directorate.
R. M. Robinson.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 161-178.

Descriptors: *Legislation, *Great Lakes, *Water pollution control, *Canada, *United States, Municipal wastes, Legal aspects, Waste treatment, Nutrients, Surface waters, International Joint Commission, Water law, Monitoring, Institutions.
Identifiers: Great Lakes Water Quality Agreement.

The development and implementation of the Great Lakes Water Quality Agreement of 1972 is reviewed. The agreement which sets out objectives and commitments of the United States and Canada regarding the protection of the water quality of the Great Lakes also identifies programs needed to achieve these objectives, establishes institutional mechanisms required to make the agreement as self-policing as possible, and creates a constant review process. An International Joint Commission is responsible for monitoring the progress on both sides and for reporting the results to the governments as well as the public. Canadian programs for installing municipal waste treatment facilities and controlling nutrient inputs are currently near to meeting the goals established in 1972. Significant progress is also being made by the United States, although adequate municipal waste treatment facilities presently serve only 60% of the sewered population on the United States side. This figure is expected to rise to 95% by 1978. (See also W76-11249) (Kreager-FIRL)
W76-11650

CONSTRUCTION SAFETY IN WATERWORKS,
Construction Safety Association of Ontario, Toronto, Ontario.
For primary bibliographic entry see Field 5F.
W76-11651

SAFETY IN WATER AND WASTEWATER PLANTS,
Ontario Ministry of the Environment (Toronto).
R. Norton.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association,April 20-23, 1975, Toronto, Ontario, p 326-331.

Descriptors: *Safety, *Treatment facilities, *Water treatment, *Waste water treatment, *Protection, Chemicals, Personnel, Programs, Management, Equipment.

The development of safety programs for water and waste water treatment plants is discussed, with particular emphasis on employer-employee responsibilities. The employer's responsibility centers around gaining the interest and cooperation of employees, with emphasis on preventive safety measures during daily operational activities. Employees in turn can assist management in the development of a preventive safety program and can alert the employer when unsafe conditions exist. Hazardous areas and activities encountered in water and waste water treatment operations include: enclosed spaces such as sewer manholes and watermain valve pits, digester control buildings where methane leaks are possible, chlorination rooms, and activities involving the handling of water treatment chemicals and the dismantling of water treatment equipment. The use of personal protective equipment in hazardous areas is also discussed. (See also W76-11249) (Kreager-FIRL)
W76-11652

OPERATOR TRAINING AND CERTIFICATION IN CANADA,
Environmental Protection Service, Ottawa (Ontario).
A. B. Redekopp. .
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 348-362. 3 tab, 7 ref.

Descriptors: *Training, *Treatment facilities, *Personnel, *Education, *Canada, Water treatment, Waste water treatment, Programs, Organizations, Operations.
Identifiers: Certification.

The status of training and certification programs for waste water and water treatment plant operators in Canada is reviewed. Voluntary certification programs have been established by four provinces to date: British Columbia, Alberta, Saskatchewan, and Manitoba. The Federation of Associations of the Canadian Environment is currently developing nationally acceptable guidelines for operator certification and is considering approaches to assist the provinces in operator training. Current training efforts in Canada cover, for the most part, the general knowledge area of water and waste water treatment operations through seminars or short courses provided by the provincial regulatory agencies and/or local operator associations. The Federal Department of the Environment, however, is currently assisting the three Maritime Provinces in the development of a comprehensive training program for waste water treatment operators which is based on a performance oriented approach to learning. (See also W76-11249) (Kreager-FIRL)
W76-11653

TRAINING AND CERTIFICATION,
Ontario Ministry of the Environment, Toronto. Training, Certification and Safety Section.
R. R. Doddridge.
In: Annual Conference Proceedings of the Ontario Section of the American Water Works Association, Pollution Control Association of Ontario, and Ontario Municipal Water Association, April 20-23, 1975, Toronto, Ontario, p 363-374. 1 fig, 4 tab, 2 ref.

Descriptors: *Training, *Treatment facilities, *Personnel, *Education, *Canada, Water treatment, Waste water treatment, Programs, Organizations, Operations.
Identifiers: Certification, Ontario.

Progress in the training and certification of water and waste water treatment plant operators in Ontario is reviewed. Training programs for water and waste water facility operators have been provided in Ontario for a number of years, with the Ontario Water Resources Commission offering annual courses at the basic, intermediate, and advanced levels. The Ontario Ministry of the Environment has proposed a 4-year program leading to mandatory certification. The development of the program was initiated in 1973 and 1974. The initial program consisted of the following elements: a basic water treatment course, a basic sewage treatment course, a basic gas chlorination workshop, and an activated sludge workshop. In 1974 and 1975 the subject areas were expanded to include a surface water treatment workshop and a maintenance gas fitter certificate course. Further expansion is scheduled for 1975 and 1976 and is expected to include a primary treatment and digestion workshop, a preventive maintenance workshop, a pumping operation workshop, and safety and first aid training. (See also W76-11249) (Kreager-FIRL)
W76-11654

NORTHERN ENVIRONMENTAL ENGINEERING - A CANADIAN CHALLENGE,
Stanley Associates Engineering Ltd., Edmonton (Alberta).
For primary bibliographic entry see Field 5D.
W76-11655

THE U. S. ENVIRONMENTAL PROTECTION AGENCY: PAST AND FUTURE CHALLENGES,
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5D.
W76-11658

AGRICULTURAL ENGINEERING WATER RESOURCES INFORMATION RETRIEVAL OF PUBLISHED LITERATURE,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 10D.
W76-11691

ESTIMATING STOCK WATER USE IN RURAL WATER SYSTEMS,
Burns and McDonnell, Kansas City, Mo.
For primary bibliographic entry see Field 3F.
W76-11696

THE ECONOMIC IMPACT OF CONTROLLING NONPOINT POLLUTION IN HARDWOOD FORESTLAND,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Economics.
W. L. Miller, and H. W. Everett.
American Journal of Agricultural Economics, Vol. 7, No. 4, p. 576-583, 1975. 1 fig., 3 tab., 24 ref. OWRT B-042-IND (7) 14-31-0001-3586

Descriptors: *Water quality control, *Economic impact, *Forest management, *Sediment control, Lumbering, *Indiana, Measurement, Income, Costs, Model studies.
Identifiers: *Nonpoint pollution control, Lincon Hills(Ind).

Two models were developed based on the Lincoln Hills area in Indiana to compare alternative measures of the economic impact of forest management practices, harvesting methods, and rates of harvest which could be introduced to reduce the sediment loss from forest land. Controlling nonpoint pollution results in substantial economic impact both on the firms directly affected and the region. As the economic activity is constrained by placing limits on soil loss at 106,280 tons per year, the regional economic impact is reduced to $1.4 million annually. The annual reduction in regional income that occurs as soil loss declines from 156,280 to 106,280 tons per year results in a 76 cent reduction in income to the region for each ton reduction in soil loss. As the soil loss level is further reduced to 56,280 tons per year, regional income is reduced about $1.4 million more annually or about an additional $28 annually for each ton reduction in soil loss. The opportunity cost of income foregone is the appropriate measure of the cost to society for introducing various nonpoint pollution control measures. The cost of controlling nonpoint pollution is being greatly underestimated; thus it is suggested that the regional impact may be a more appropriate measure than the direct impact. (Auen-Wisconsin).
W76-11697

FACTORS INFLUENCING NITRATE TRANSFORMATIONS IN SEDIMENTS,
Purdue Univ., Lafayette, Ind. Agricultural Experiment Station.
For primary bibliographic entry see Field 5C.
W76-11700

STATUS REPORT ON HEAT STORAGE WELLS,
General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
C. F. Meyer.
Water Resources Bulletin, Vol. 12, No. 2, p 237-252, April, 1976. 5 fig, 1 tab, 11 ref. OWRT C-5205 (4210)(4).

Descriptors: *Thermal power, *Thermal water, *Thermal conductivity, Heat transfer, Groundwater, Aquifers, Pipelines, Thermodynamics, Thermal radiation, Heat balance, Electric powerplants, Electric power costs, Injection wells, Mathematical models, *Underground storage, Thermal pollution.
Identifiers: *Thermal energy, *Heat storage wells, Waste heat, Eulerian models.

Enough technical information now exists to support preliminary conclusions that large amounts of hot water can be stored in aquifers for several months, at low cost and with low heat loss, using the Heat Storage Well concept. Heat Storage Wells offer the possibility of conserving a substantial part of the heat energy now wasted in generating electricity while reducing thermal pollution caused by waste heat. Large thermal electric power plants would produce heat at useful temperatures such as 300-400 deg. F. Combined electric and heat-generating systems will require low-cost, and low-loss storage of large amounts of hot water for periods of 90 to 180 days to serve both electric loads and seasonally varying heat loads. Compared to conventional electricity only systems, combined electricity-heat systems can save more than 20 percent in energy, reduce the cost of both electricity and heat, and eliminate the need for water cooling structures. Possibilities for changes in legal and institutional practices are suggested, such as making resource-allocation decisions on the basis of energy units rather than dollars. (Heiss-NWWA)
W76-11701

PRACTICAL APPLICATIONS OF SPACE SYSTEMS, SUPPORTING PAPER 7, ENVIRONMENTAL QUALITY.
National Research Council, Washington, D. C. Panel on Environmental Quality.
For primary bibliographic entry see Field 4A.
W76-11760

OVERLAND FLOW PRETREATMENT OF WASTEWATER,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W76-11775

REMOVAL OF UNDESIRABLE CATIONS FROM ACID MINE WATER BY A NEW CATION-EXCHANGE MATERIAL,
West Virginia Univ., Morgantown. Water Research Inst.
For primary bibliographic entry see Field 5D.
W76-11776

WATER POLLUTION CONTROL ACT OF 1972, ECONOMIC IMPACTS, MEAT PRODUCTS,
Development Planning and Research Associates, Inc., Manhattan, Kans.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-251 215, $16.25 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D. C. Report NCWQ 75/48, November 1975, 617 p. WQ5ACO11.

Descriptors: *Pollution abatement, *Industrial wastes, Industries, Forecasting, *Federal Water Pollution Control Act, *Economic impact, *Industrial plants, *Water pollution control, *Operating costs, *Estimated costs, Foods, *Food processing industry.
Identifiers: *Meat products industry, Federal Water Pollution Control Act Amendments of 1972.

Economic impact on the meat products industry of achieving the 1977 best practicable technology (BPT) and 1983 best achievable technology (BAT) effluent limitation requirements of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) were assessed. The analysis considers these impacts in four categories of the industry -- processing, rendering, packing and poultry. Estimated price increases as a result of the Act are given along with total investment and anticipated operating costs necessary to meet the Act's requirements. The analysis projects the numbers and kinds of plants most likely to close as a result of the BPT and BAT requirements, and estimates resulting employment losses for each category. (NCWQ)
W76-11779

PUBLIC LAW 92-500: TECHNOLOGY ASSESSMENT, TECHNICAL VOLUME.
National Commission on Water Quality, Washington, D.C. Technology Assessment Sector.
C. W. Carry, J. C. Baummer, Jr., R. G. Kissell, Jr., D. B. Large, and D. M. Wells.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-252 298. $21.25 inpaper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/109, April 1976, 795 p.

Descriptors: *Industries, *Technology, *Treatment facilities, *Industrial wastes, Costs, Manpower, Energy, *Water pollution control, Pollution abatement, *Water quality standards, Water law, *Federal Water Pollution Control Act, *Municipal wastes, Methodology.
Identifiers: Federal Water Pollution Control Act of 1972, *Technology assessment.

Technologies capable of achieving compliance with effluent limitations required for dischargers to comply with Public Law 92-500 were investigated. Applicable technologies were determined for publicly owned treatment works, industry and irrigated agriculture point sources. Costs and manpower and energy requirements for each technology were also defined. Technologies capable of reducing pollutants from non-point sources were examined in summary fashion. A technical assessment of Public Law 92-500 is presented along with an explanation of methodology, data sources and Commission staff calculations. Also included are lists of Contractors and Consultants and summaries of about 20 Technology Contractor Reports. (NCWQ)
W76-11780

ENVIRONMENTAL IMPACT ASSESSMENT, WATER QUALITY ANALYSIS, YADKIN - PEE DEE RIVER BASIN,
TRW, Inc. Redondo Beach, California.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-250 933, $8.00 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/65, May 1975. 217 p, 7 fig, 34 tab. WQ5ACO38.

Descriptors: River basins, *Federal Water Pollution Control Act, Ecology, Environmental effects, *North Carolina, Environment, *Comprehensive planning, Limnology, Water pollution control, *South Carolina, Forecasting, Water quality, Waste water treatment, Sites, Pollution abatement.
Identifiers: *Environmental impact, Federal Water Pollution Control Act Amendments of 1972, *Yadkin-Pee Dee River basin(NC-SC).

A comprehensive water quality analysis and environmental impact assessment at the Yadkin-Pee Dee River Basin was undertaken as part of a national assessment of anticipated environmental impacts of theoretically achieving or not achieving the requirements and goals of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The analysis (1) characterized historical and existing water quality and environmental conditions, (2) projected resultant water quality assuming specific levels of wastewater treatment to point source effluents entering the study site, and (3) anticipated biological, ecological and environmental effects, impacts and benefits to result from projected changes in water quality. This site assessment is one of 41 similar studies conducted for the Environmental Sciences sector of the Commission. National on Water Quality. (NCWQ)
W76-11781

WATER POLLUTION CONTROL ACT OF 1972, ENVIRONMENTAL IMPACT ASSESSMENT, POTOMAC RIVER.
Academy of Natural Sciences, Philadelphia, Pa.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-250 934, $7.75 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/68, July 1975. 202 p, 4 fig, 10 tab, 86 ref, 6 append. WQ5ACO44.

Descriptors: Rivers, *River basins, *Potomac River, *Virginia, Ecology, *Federal Water Pollution Control Act, Environment, *Comprehensive planning, Limnology, *Water pollution control, *Maryland, *District of Columbia, *Pollution abatement, *Forecasting, Environmental effects, *Water quality, Waste water treatment, Sites.
Identifiers: *Environmental impact, Federal Water Pollution Control Act Amendments of 1972, *Potomac River estuary(DC-Va-Md).

A comprehensive environmental impact assessment at the Potomac River was undertaken as part of a national assessment of anticipated environmental impacts of theoretically achieving or not achieving the requirements and goals of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The analysis (1) characterized historical and existing environmental conditions and (2) projected anticipated biological, ecological and environmental change, impacts and benefits, assuming specific reductions in point source effluent loadings and resultant water quality within the site. This site assessment was one of 41 similar studies conducted for the Environmental Sciences sector of the National Commission on Water Quality. (NCWQ)
W76-11782

WATER QUALITY ANALYSIS, SNAKE RIVER, IDAHO.
Tetra Tech, Inc., Lafayette, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-250 929, $5.50 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/60, February 1976. 105 p, 30 fig, 20 tab, 16 ref. WQ5ACO27.

Descriptors: Sites, *Idaho, *Federal Water Pollution Control Act, Rivers, *Comprehensive planning, *River basins, Ecology, Environmental effects, Environment, Water pollution, *Pollution abatement, *Water quality, *Forecasting, Waste water treatment.
Identifiers: Federal Water Pollution Control Act Amendments of 1972, *Snake River(Idaho).

A comprehensive water quality analysis at the Snake River, Idaho, was undertaken as part of a national assessment of anticipated environmental

impacts of theoretically achieving or not achieving the requirements and goals of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The analysis (1) characterized historical and existing water quality conditions and (2) projected resultant water quality within the site, assuming specific levels of wastewater treatment to point source effluents entering the study site. This assessment is one of 41 similar studies conducted for the Environmental Sciences sector of the National Commission on Water Quality. (NCWQ)
W76-11783

WATER POLLUTION CONTROL ACT OF 1972, ENVIRONMENTAL IMPACT ASSESSMENT, SNAKE RIVER.
Parametrix, Inc., Seattle, Wash.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-251 226, $7.50 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/69, January 1976. 170 p, 8 fig, 34 tab, 62 ref, 2 append. WQ5ACO36.

Descriptors: Rivers, River basins, *Federal Water Pollution Control Act, Ecology, *Comprehensive planning, *Idaho, Environment, Limnology, *Environmental effects, *Water pollution control, *Pollution abatement, *Forecasting, *Water quality, Waste water treatment, Sites.
Identifiers: Environmental impact, Federal Water Pollution Control Act Amendments of 1972, *Snake River(Idaho).

A comprehensive environmental impact assessment at the Snake River was undertaken as part of a national assessment of anticipated environmental impacts of theoretically achieving or not achieving the requirements and goals of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The analysis (1) characterized historical and existing environmental conditions and (2) projected anticipated biological, ecological and environmental change, impacts and benefits, assuming specific reductions in point source effluent loadings and resultant water quality within the site. This site assessment was one of 41 similar studies conducted for the Environmental Sciences sector of the National Commission on Water Quality. (NCWQ)
W76-11784

WATER QUALITY ANALYSIS, UPPER RIO GRANDE.
Water Resources Engineers, Inc., Austin, Tex.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-250 981, $4.50 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/55, March 1975. 60 p, 2 fig, 22 tab, 7 ref. WQ5ACO29.

Descriptors: Sites, *Comprehensive planning, Rivers, *Texas, *New Mexico, Colorado, *River basins, Ecology, *Rio Grande River, Environment, Environmental effects, Water pollution, *Pollution abatement, *Water quality, *Federal Water Pollution Control Act, *Forecasting, Waste water treatment.
Identifiers: Federal Water Pollution Control Act Amendments of 1972, *Upper Rio Grande River(Tex-N Mex).

A comprehensive water quality analysis at the Upper Rio Grande was undertaken as part of a national assessment of anticipated environmental impacts of theoretically achieving or not achieving the requirements and goals of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The analysis (1) characterized historical and existing water quality conditions and (2) projected resultant water quality within the site, assuming specific levels of wastewater treatment to point source effluents entering the study site. This assessment is one of 41 similar studies conducted for the Environmental Sciences sector of the National Commission on Water Quality. (NCWQ)
W76-11785

WATER POLLUTION CONTROL ACT OF 1972, ENVIRONMENTAL IMPACT ASSESSMENT, IOWA-CEDAR RIVER BASIN.
Midwest Research Inst., Minneapolis, Minn. North Star Research Div.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-251 227, $12.00 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/70, March 1976. 430 p, 43 fig, 30 tab, 73 ref, 8 append. WQ5AC039.

Descriptors: Rivers, *River basins, *Federal Water Pollution Control Act, Ecology, *Environmental effects, Iowa, Environment, *Comprehensive planning, Limnology, *Water pollution control, *Pollution abatement, *Forecasting, *Water quality, Waste water treatment, Sites.
Identifiers: Federal Water Pollution Control Act Amendments of 1972, *Iowa-Cedar Rivers(Iowa).

A comprehensive environmental impact assessment at the Iowa-Cedar Rivers was undertaken as part of a national assessment of anticipated environmental impacts of theoretically achieving or not achieving the requirements and goals of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The analysis (1) characterized historical and existing environmental conditions and (2) projected anticipated biological, ecological and environmental change, impacts and benefits, assuming specific reductions in point source effluent loadings and resultant water quality within the site. This site assessment was one of 41 similar studies conducted for the Environmental Sciences sector of the National Commission on Water Quality. (NCWQ)
W76-11786

ENVIRONMENTAL IMPACT ASSESSMENT, WATER QUALITY ANALYSIS, J. PERCY PRIEST RESERVOIR.
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-251 098, $9.25 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/52, August 1975. 270 p, 61 fig, 66 tab, 32 ref, 7 append. WQ5AC065.

Descriptors: *Reservoirs, *Federal Water Pollution Control Act, Ecology, *Environmental effects, *Tennessee, Environment, *Comprehensive planning, Limnology, Water pollution control, *Forecasting, *Water quality, Waste water treatment, Sites, *Pollution abatement.
Identifiers: Environmental impacts, Federal Water Pollution Control Act Amendments of 1972, J. Percy Priest Reservoir(Tenn).

A comprehensive water quality analysis and environmental impact assessment at the J. Percy Priest Reservoir was undertaken as part of a national assessment of anticipated environmental impacts of theoretically achieving or not achieving the requirements of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The analysis (1) characterized historical and existing water quality and environmental conditions, (2) projected resultant water quality, assuming specific levels of wastewater treatment to point source effluents entering the study site, and (3) anticipated biological, ecological and environmental effects, impacts and benefits to result from projected changes in water quality. This site assessment is one of 41 similar studies conducted for the Environmental Sciences sector of the Commission. (NCWQ)
W76-11787

ENVIRONMENTAL IMPACT ASSESSMENT, WATER QUALITY ANALYSIS, UTAH LAKE - JORDAN RIVER BASIN.
Environmental Dynamics, Inc., Los Angeles, Calif.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-250 932, $9.25 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/63, December 1975. 357 p, 55 fig, 87 tab, 2 append. WQ5AC071.

Descriptors: *River basins, *Federal Water Pollution Control Act, Ecology, *Utah, *Comprehensive planning, Environment, *Environmental effects, *Lakes, Limnology, *Water pollution control, *Forecasting, *Water quality, Waste water treatment, Sites, Pollution abatement.
Identifiers: *Utah Lake-Jordan River Basin(Utah), Environmental impact, Federal Water Pollution Control Act Amendments of 1972.

A comprehensive water quality analysis and environmental impact assessment at Utah Lake - Jordan River Basin was undertaken as part of a national assessment of anticipated environmental impacts of theoretically achieving or not achieving the requirements of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The analysis (1) characterized historical and existing water quality and environmental conditions, (2) projected resultant water quality, assuming specific levels of wastewater treatment to point source effluents entering the study site, and (3) anticipated biological, ecological and environmental effects, impacts and benefits to result from projected changes in water quality. This site assessment is one of 41 similar studies conducted for the Environmental Sciences sector of the National Commission on Water Quality. (NCWQ)
W76-11788

WATER POLLUTION CONTROL ACT OF 1972, REGIONAL IMPACTS, YELLOWSTONE RIVER BASIN.
Stevens, Thompson and Runyan, Inc. Seattle, Wash.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-251 072, $7.25 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/50, March 1976. 205 p, 15 fig, 62 tab, 224 ref. WQ5AC051.

Descriptors: *River basins, *Regional analysis, Wyoming, Montana, Regions, *Federal Water Pollution Control Act, Water pollution control, Capital costs, Pollution abatement, Water quality, Treatment facilities, Water law, Evaluation, *Estimated costs, Forecasting, Estimating, Industries, Social change, *Social impact, Water utilization.
Identifiers: *Yellowstone River Basin(Wyo-Mont), Federal Water Pollution Control Act Amendments of 1972.

The environmental, economic, social and institutional impacts of the Federal Water Pollution Control Act Amendments (PL 92-500) in the Yellowstone region will generally be small and will occur near the various dischargers. The 1983 best available treatment (BAT) and 1985 elimination of discharge (EOD) goals of the Act will not provide a measurable change in the long-term water quality and biological conditions resulting from the 1977 best practicable technology (BPT) requirements of the Act. Total capital costs (in 1973 dollars) will be an estimated $114 million for BPT with an additional $140 million for BAT. Industries most heavily impacted will be uranium mining, coal mining and sugar beet processing. Communities with 2,500 people or less, which are required to construct new or upgraded treatment facilities, may experience severe social impacts. Regarding water use, strict implementation of the law has a potential to create several economic, legal and water

quality problems with apparently insignificant water quality benefits to offset these problems. (NCWQ)
W76-11789

ENVIRONMENTAL IMPACT ASSESSMENT, WATER QUALITY ANALYSIS, LOWER MISSOURI RIVER BASIN.
Midwest Research Inst., Kansas City, Mo.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-250 930, $7.75 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/61, December 1975. 207 p, 45 fig, 37 tab, 47 ref, append. WQ5AC024.

Descriptors: Rivers, *Missouri River, Environmental effects, Ecology, *Federal Water Pollution Control Act, Environment, Limnology, *Missouri, *Kansas, *Water pollution control, *Forecasting, *Water quality, Waste water treatment, Sites, Pollution abatement.
Identifiers: Environmental impact, Federal Water Pollution Control Act Amendments of 1972, *Lower Missouri River basin(Mo-Kan).

A comprehensive water quality analysis and environmental impact assessment at the Lower Missouri River was undertaken as part of a national assessment of anticipated environmental impacts of theoretically achieving or not achieving the requirements of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The analysis (1) characterized historical and existing water quality and environmental conditions, (2) projected resultant water quality, assuming specific levels of wastewater treatment to point source effluents entering the study site, and (3) anticipated biological, ecological and environmental effects, impacts and benefits to result from projected changes in water quality. This site assessment is one of 41 similar studies conducted for the Environmental Sciences sector of the National Commission on Water Quality. (NCWQ)
W76-11790

WATER POLLUTION CONTROL ACT OF 1972, ENVIRONMENTAL IMPACT ASSESSMENT, UPPER MISSISSIPPI RIVER BASIN,
Midwest Research Inst., Minneapolis, Minn. North Star Research Div.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-251 222, $10.00 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/74, March 1976. 322 p, 42 fig, 38 tab, 89 ref, 7 append. WQ5AC039.

Descriptors: Sites, *Federal Water Pollution Control Act, Rivers, *River basins, *Mississippi River basin, Ecology, Environment, *Comprehensive planning, Limnology, *Water pollution control, *Minnesota, *Wisconsin, *Pollution abatement, *Forecasting, Environmental effects, *Water quality, Waste water treatment.
Identifiers: Environmental impact, Federal Water Pollution Control Act Amendments of 1972, *Upper Mississippi River Basin(Minn-Wisc).

A comprehensive environmental impact assessment at the Mississippi-Minnesota-St. Croix confluence was undertaken as part of a national assessment of anticipated environmental impacts of theoretically achieving or not achieving the requirements and goals of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The analysis (1) characterized historical and existing environmental conditions and (2) projected biological, ecological and environmental change, impacts and benefits, assuming specific reductions in point source effluent loadings and resultant water quality within the site. This site assessment is one of 41 similar studies conducted for the Environmental Sciences sector of the National Commission on Water Quality. (NCWQ)
W76-11791

WATER POLLUTION CONTROL ACT OF 1972, ECONOMIC IMPACTS, DAIRY PRODUCTS.
Development Planning and Research Associates, Inc., Manhattan, Kans.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-251 217, $8.00 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/46, November 1975, 215 p. WQ5ACO11.

Descriptors: *Pollution abatement, *Economic impact, *Cost analysis, *Federal Water Pollution Control Act, Industries, Treatment facilities, Forecasting, *Estimated costs, Income, Prices, Engineering costs, *Industrial plants, *Water pollution control, *Dairy industry, *Food processing industry.
Identifiers: Federal Water Pollution Control Act Amendments of 1972.

The economic impacts on the dairy industry of meeting the requirements of the Federal Water Pollution Control Act Amendments of 1972 are examined. The impostion of the 1977 best practicable technology (BPT) and 1983 best available technology (BAT) controls will reduce the net income of larger plants by 30% and a reduction of 50% will be experienced by medium size plants. Of the 4,590 existing establishments, an estimated 164 plants will close as a result of 1977 controls, and the combined costs of BPT and BAT will result in approximately 96 fewer plants in 1983 than in baseline. Most heavily impacted will be single plant firms. Price increases will be about 1% over baseline for BPT with an increase of 0.4% over baseline for BAT. Those dairy product plants which do not discharge into municipal systems can meet BPT by biological treatment systems. Housekeeping improvements coupled with a reduction in water use are recommended to ease the wasteload. BAT requirements can be met by adding tertiary filtration or land disposal to the BPT controls. (NCWQ)
W76-11801

WATER POLLUTION CONTROL ACT OF 1972, ECONOMIC IMPACTS, FOREIGN TRADE,
Public Research Inst., Arlington, Va.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 949, $10.50 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/34, February 1976. 355 p, 6 fig, 65 tab. WQ5AC009.

Descriptors: Pollution abatement, *Industries, *Economic impact, Iron, Steel, Aluminum, Copper, *Federal Water Pollution Control Act, Forecasting, *Econometrics, Estimating, *Import, *Foreign trade, Water pollution control, *Pulp and paper industry, *Food processing industry, *Mineral industry, Textiles.
Identifiers: Federal Water Pollution Control Act Amendments of 1972.

An analysis is presented of the impacts of the Federal Water Pollution Control Act Amendments of 1972 on seven industries -- iron and steel, aluminum, copper, textiles, pulp and paper, leather tanning and red meat. Econometric models with foreign trade sectors were developed and estimated for each of the industries. Import penetration in the iron and steel industry will increase by an estimated 6% by 1985. Pulp production is estimated to decrease by as much as 1.5%, newsprint by as much as 3% and paperboard by as much as 6%. In most industries with high pollution abatement costs, the volume of trade is small compared to domestic production. Even major percentage changes in the volume of trade do not significantly affect the domestic industry. (NCWQ)
W76-11802

WATER POLLUTION CONTROL ACT OF 1972, ECONOMIC IMPACTS, FRUITS AND VEGETABLES.
Development Planning and Research Associates, Inc., Manhattan, Kans.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-251 216, $10.75 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/45, November 1975, 357 p. WQ5AC011.

Descriptors: *Water pollution control, *Economic impact, *Cost analysis, *Federal Water Pollution Control Act, Forecasting, *Treatment facilities, *Capital costs, Engineering costs, Prices, *Estimated costs, *Pollution abatement, *Industrial plants, *Canneries, *Food processing industry.
Identifiers: Federal Water Pollution Control Act Amendments of 1972.

The economic impacts on the fruits and vegetables processing industry of achieving the 1977 best practicable technology (BPT) and 1983 best available technology (BAT) requirements of the Federal Water Pollution Control Act Amendments of 1972 are assessed. The greatest price increases will be required by small and medium size plants in the corn, tomato and sauerkraut sectors. Increased prices will be an estimated 0.26% over baseline for BPT and will increase by an estimated .47% with the addition of pretreatment costs. Under BAT control standards, this figure becomes 0.62% by 1983. Total capital costs (in 1973 dollars) for BPT will be an estimated $128 million and $201.9 million for BPT and BAT respectively. Plant closures due to BPT are projected at 107 and an estimated 128 plants will close as a result of the combined costs of BPT and BAT. Most severely impacted will be the citrus plants in Florida, and potato dehydrating plants in Idaho, Oregon and Washington. (NCWQ)
W76-11803

WATER POLLUTION CONTROL ACT OF 1972, TECHNOLOGIES AND ECONOMIC IMPACTS, THE FEEDLOT INDUSTRY,
Development Planning and Research Associates, Inc., Manhattan, Kans.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-251 214, $10.75 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/47, November 1975. 409 p, 2 fig, 82 tab, 6 append. WQ5AC011.

Descriptors: *Pollution abatement, *Economic impact, *Feed lots, *Cost analysis, *Federal Water Pollution Control Act, Forecasting, Farm wastes, Technology, *Estimated costs, Engineering costs, Dairy industry, Hogs, *Water pollution control, Poultry.
Identifiers: *Feed lot industry, Beef, Federal Water Pollution Control Act Amendments of 1972.

The necessary technologies and associated economic impacts on the feedlot industry to meet the requirements of the Federal Water Pollution Control Act Amendments of 1972 are examined. Seventeen technologies and related costs for the beef, turkey, dairy and hog categories of the industry are assessed. If the law applies only to those feedlots which discharge directly into streams, compliance will require a total investment of between $346-446 million for best practicable tecnology (BPT), with an additional $107-118 million for BAT best available technology. Annual costs will be an estimated $66-82 million and $15 million for BPT and BAT respectively. Estimated total costs will triple if the law applies to all feedlots. The hog sector will require the most expenditures for effluent control, while the heaviest price and quantity impacts, though generally less than 1%, will fall in the dairy and turkey categories. Small feedlots will be the most heavily impacted and (among direct dischargers) an estimated 37,000 to 77,000 feedlot plants will close by

1977, with an additional 2,800-5,000 closing by 1983. About 80% of the closures will occur in the dairy and hog categories. (NCWQ)
W76-11804

WATER POLLUTION CONTROL ACT OF 1972, DEMOGRAPHIC AND QUANTITATIVE ANALYSIS,
Human Resources Planning Inst., Seattle, Wash.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-251 321, $5.50 in paper copy, $3.00 in microfiche. National Commission on Water Quality, Washington, D.C., Report NCWQ 75/44, December 1975. 112 p, 11 fig, 22 tab, 29 ref. WQ5AC086.

Descriptors: *Pollution abatement, *Social impact, Human population, Forecasting, *Federal Water Pollution Control Act, Water pollution control, Industrial plants, *Employment, Northeast U.S., Central U.S., *Unemployment, *Employment opportunities, Recreation, *Social change.
Identifiers: Federal Water Pollution Control Act Amendments of 1972.

An assessment is presented of the social impacts resulting from the primary and secondary impacts (as measured by changes in employment) of the Federal Water Pollution Control Act of 1972. Job creation, as a result of the Act, will accrue primarily to younger, white males in the middle income category. Females, older workers, and low income workers will be among those to experience the heaviest job losses. Plant closures (which will most heavily affect low income groups) will be concentrated in the Northeast and Northcentral regions of the U.S. If the existing lack of participation in water based recreation is a function of polluted water bodies, then recreation benefits will accrue most heavily to low income, non-white urban males. If, however, this low participation is a reflection of consumer preference rather than lack of clean water, greatest benefits will be concentrated among upper income, non-urban white males. (NCWQ)
W76-11805

PUBLIC LAW 92-500-- WATER QUALITY ANALYSIS AND ENVIRONMENTAL IMPACT ASSESSMENT, TECHNICAL REPORT (VOLUME I),
National Commission on Water Quality, Washington, D. C. Environmental Sciences Sector.
H. L. Allen, L. E. Johnson, R. E. Keen, E. R. Meyer, and J. L. Peterson.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-252 167-01-02 SET, $28.25 in paper copy, $3.00 in microfiche. Report NCWQ-75-100-1, April, 1976. 527 p.

Descriptors: Regions, *Federal Water Pollution Control Act, Sites, *Methodology, Water quality standards, Ecology, Projections, Benefits, Environmental effects, Limnology, *Water pollution control, *Regional analysis, *Pollution abatement, *Forecasting, *Water quality, Waste water treatment.
Identifiers: *Environmental impact, Federal Water Pollution Control Act Amendments of 1972.

The Environmental Sciences sector of the National Commission on Water Quality was charged with conducting a national water quality and environmental impact assessment as part of a larger analysis of the effects of achieving or not achieving the requirements and goals of the Federal Water Pollution Control Act Amendments of 1972 (P. L. 92-500). The overall study methodology, including inherent assumptions and limitations, is outlined. A major part of the national assessment focused on 41 site-specific studies in which historical and existing water quality and environmental conditions are assessed, followed by projections of change, impacts and benefits to result from abatement of point source effluent loadings. Results and findings from these studies are collated, reviewed and summarized, both regionally and nationally, and are presented in this volume. Volume II contains other special water quality and environmental assessment topics. (See also W76-11807) (NCWQ)
W76-11806

PUBLIC LAW 92-500--WATER QUALITY ANALYSIS AND ENVIRONMENTAL IMPACT ASSESSMENT, TECHNICAL REPORT, VOLUME II,
National Commission on Water Quality, Washington, D. C. Environmental Sciences Sector.
J. L. Allen, L. E. Johnson, R. E. Keen, E. R. Meyer, and J. L. Peterson.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-252 167-01-02 SET, $28.25 in paper copy, $3.00 in microfiche. Report NCWQ 75/100-2, April 1976, 570 p.

Descriptors: Regions, *Federal Water Pollution Control Act, Sites, *Methodology, Water quality standards, Ecology, Projections, Benefits, Environmental effects, Limnology, *Water pollution control, *Pollution abatement, *Regional analysis, *Forecasting, *Water quality, Waste water treatment.
Identifiers: *Environmental impact, Federal Water Pollution Control Act Amendments of 1972.

Special environmental assessment topics are presented, including (1) analysis of environmental effects of disposal of municipal and industrial wastewater-treatment residuals; (2) environmental effects of the disposal of municipal effluents into near shore marine waters; (3) effects of pollutants on bird species,; (4) evaluation of water quality models for site-specific and regional areas; (5) an overview of national waste loads and urban-suburban stream quality response; (6) a summary of national residuals production; (7) patterns in nine selected standing water bodies; (8) a summary of biological data used in site-specific studies; (9) the state of the art of projecting ecological and environmental change; (10) a review of existing water quality and environmental data systems, and (11) recommendations for advancing the state of the art of projecting water quality and environmental change. Appendix information includes work statements used in the studies, a listing of criteria applicable to possible expemptions under section 316 (thermal) of the Act and a list of staff, consultants etc. contributing to this report. (See also W76-11806) (NCWQ)
W76-11807

SHIP BALLAST, OIL AND WATER SEPARATION SYSTEM,
J. Di Perna.
U.S. Patent No. 3,957,009, 3 p, 5 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 946, No 3, p 1031, May 18, 1976.

Descriptors: *Patents, *Oil pollution, *Oily water, *Water pollution control, *Water pollution treatment, Water quality control, *Separation techniques, Floating.
Identifiers: Ballast water.

The oil and ship ballast water separation system includes a main pipe extending longitudinally through the amid-ship tanks and which is connected by cross-tees to a series of branch pipes extending sideways and leading into the wing tanks. Each one of the tanks are connected to an upward extending flexible accordion pipe or duct which at its upper end is connected to a floating oil collection unit which includes a buoyant collar around a downward converging funnel that is open on top. The buoyancy of the collar is such that the floation of the unit is with the upper edge of the funnel being at water level surface, so that only oil above the water level flows down into the funnel. The main pipe extends at one end into the collection tank where it is fitted with an upward turned elbow so that the oil from all the tanks is thus collected in the collection tank. In operative use, it is now evident that prior to returning ballast water back into the sea, the residue oil is thus removed from the tanks on a day when the ship is not excessively rolling or pitching so that the oil is steady on top. After the oil is removed, the ballast water is returned to the sea prior to entry into port without contaminating the sea. (Sinha - OEIS)
W76-11827

DEVICE FOR SEPARATING LIQUIDS OF SPECIFICALLY LOWER DENSITY THAN WATER, AND PARTICULARLY OIL, FROM WATER,
Fabrique Euro Pollution Control Systems, Inc. (Luxemburg). (Assignee).
P. Jakubek, and K. Biswanger.
U.S. Patent No. 3,957,641, 4 p, 3 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 946, No 3, p 1231, May 18, 1976.

Descriptors: *Patents, *Oil pollution, *Oily water, Water pollution sources, *Water quality control, *Water pollution treatment, *Separation techniques, Density stratification, Pumps, Equipment.
Identifiers: Bilge water.

A device for separating liquids of lower density than water, in particular oil, from water, comprises a pump and a separator receiving the liquids from the pump. The separator has a settling chamber and a filter pack arranged behind the latter. A line between the pump and the settling chamber feeds the liquids to the settling chamber and includes a vent valve. An overflow opening device is provided between the settling chamber and the filter pack. A shutoff member is provided for closing the overflow opening in response to the thickness of the layer of liquid of lower density collected in the settling chamber. The device is intended to make an effective pumping out of bilges possible and to reliably prevent water which has been contaminated with oil or the like from being pumped overboard. Also the device should be capable of automatic operation without requiring complicated electric controls. (Sinha - OEIS)
W76-11836

INSTALLATION FOR REMOVING POLLUTANTS FROM WATERWAYS,
F. M. Wickert.
U.S. Patent No. 3,957,646, 9 p, 13 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 946, No 3, p 1233, May 18, 1976.

Descriptors: *Patents, *Water pollution control, Water pollution sources, *Oil pollution, Oil spills, *Oily water, Water pollution treatment, Water quality control, *Separation techniques, Skimming, River flow, Streamflow, Equipment.

A floating installation for the recovery of a liquid pollutant such as petroleum or the like, from navigable waterways, includes a main vessel adapted for floating movement in the water. A receiving tank connected to the main vessel, has a hinged scoop for skimming the liquid pollutant from the water surface as the vessel moves. The scoop is equipped with buoys for controlling the level of the inlet end with respect to the water surface. The opposite or discharge end of the scoop is connected to the receiving tank. The receiving tank is mounted for movement relative to the main vessel, such that it can float in the water independently of the main vessel. A primary separation means including settling tanks are supported on the main vessel to receive the collected pollutants and for separation of the water collected with the pollutants. A secondary separating means is connected to the settling tanks for selectively separating the remaining water from the pollutant after the primary separation and for discharging the

water from the vessel while transferring the recovered pollutant to storage tanks for subsequent further refinement and use.
W76-11837

REMOVING OIL FROM WASTE WATER WITH SULFUR,
Amoco Production Co., Tulsa, Okla. (Assignee).
L. W. Jones.
U.S. Patent No. 3,957,647, 6 p, 6 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 946, No 3, p 1233, May 18, 1976.

Descriptors: *Patents, *Water pollution control, Water pollution treatment, Water quality control, *Oil pollution, *Oily water, *Coalescence, Coagulation, *Separation techniques, *Sulfur, Filtration.

A method of removing dispersed oil from water is by contacting the oily water with sulfur to cause the oil to coalesce or agglomerate. In a preferred embodiment, the water containing the dispersed oil is flowed through a bed of granular media of granular sulfur or sulfur coated sand, which presents a surface area of solid phase sulfur to coalesce the dispersed oil. The coalesced oil is then separated from the water. In another embodiment, a sulfur slurry is mixed with the oily water to cause the oil to coagulate with the sulfur. A separator, such as a cyclone separator, separates the coagulate from the water. (Sinha - OEIS)
W76-11838

METHOD OF INHIBITING SCALE FOR HIGH TEMPERATURE STEAM WELLS,
Union Oil Co. of California, Brea. (Assignee).
For primary bibliographic entry see Field 8G.
W76-11842

BIODEGRADATION OF OIL ON WATER SURFACES,
Office of the Secretary (Navy), Washington, D. C. (Assignee).
R. Bartha, and R. M. Atlas.
U.S. Patent No. 3,959,127, 3 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 946, No 4, p 1737, May 25, 1976.

Descriptors: *Biodegradation, *Patents, *Oil spills, *Oil pollution, Water pollution sources, *Water pollution treatment, *Water pollution control, Water quality control, *Microbial degradation, Aquatic microbiology, Nutrients, Nitrogen compounds, Phosphorus compounds, Microorganisms.

Polluting oil left to its natural fate is eventually consumed by microorganisms that use it as a source of carbon and energy. This natural biodegradation is a slow process, and is consequently unable to prevent the oil from causing extensive damage before its ultimate elimination. This invention describes a way to speed up this natural biodegradation process to a level that allows its use as an oil cleanup process and technique. This greatly enhanced rate of oil degradation is accomplished by applying the essential microbial nutrients to the oil slicks in a form that dissolves in or adheres to the oil and thus selectively stimulates the activity of oil-metabolizing microorganisms. For maximum proliferation and metabolic activity, hydrocarbon degrading microorganisms require additional nutrients such as nitrates and phosphates. These are absent from oil and are typically present in natural waters in limiting amounts only. The nitrogen and phosphorous sources are a paraffinized urea slow-release garden fertilizer with a nitrogen content of substantially 25% and pyrophosphoric acid dioctyl ester in a substantially 9 to 1 ratio of fertilizer to ester. (Sinha-OEIS)
W76-11844

OIL COLLECTION AGENTS AND THEIR USE IN CONTAINING OIL SLICKS,
Exxon Research and Engineering Co., Linden, N. J. (Assignee).
G. P. Canevari.
U.S. Patent No. 3,959,134, 6 p, 1 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 946, No 4, p 1739, May 25, 1976.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water pollution sources, *Water pollution treatment, *Water pollution control, Water quality control, Surfactants, Surface tension.
Identifiers: Oil slicks.

It has been found that oil slicks can be contracted and contained by contacting the perimeter of the oil slicks or the water surrounding the oil slicks with an oil collection agent comprised of a mixture of C10-C20 aliphatic monocarboxylic acid or sorbitan monoester in combination with a nonpolar solvent or a solvent package that is essentially nonpolar. The effective spreading caused by the spreading pressure of the oil collection agent thereby reduces the area of the oil slick in size and the oil may thereafter be destroyed or physically removed from the water. The oil collection agents encompassed by this invention have the additional advantages of having low toxicities as well as pour points low enough to enable their use during operations where water and/or air temperatures are less than 45 Deg F. (Sinha-OEIS)
W76-11845

OIL SPILL CLEANUP METHOD AND APPARATUS,
Shell Oil Co., Houston, Tex. (Assignee).
R. R. Ayers, and D. P. Hemphill.
U.S. Patent No. 3,959,136, 4 p, 5 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 946, No 4, p 1740, May 25, 1976.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water pollution sources, *Water pollution treatment, *Water pollution control, Water quality control, *Skimming, Equipment, *Separation techniques.

A method and apparatus is provided whereby an oil spill, in particular a small volume spill, can be skimmed from the water in an efficient and economical manner. The apparatus is a skimmer positioned between the sides of a catamaran and held by hinges so as to be pivotable. The skimmer has baffled entry ports which are arranged on a plane adjustably inclined or about the periphery of a drum so that oil enters to a chamber which is beneath an inverted funnel suspended over the interior of the skimmer or which is the axle of the drum. The skimmer is inclined so that the baffled entry port is at an angle relative to the current. Oil is collected within the skimmer and the position of the skimmer is changed to horizontal. The oil is then withdrawn from the top of the skimmer through the inverted funnel. (Sinha-OEIS)
W76-11846

HYDROMETEOROLOGY OF HEAVY RAINSTORMS IN CHICAGO AND NORTHEASTERN ILLINOIS, PHASE I - HISTORICAL STUDIES,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W76-11875

THE FUTURE OF THE SAVANNAH RIVER, PROCEEDINGS OF A SYMPOSIUM.
Clemson Univ., S.C. Water Resources Research Inst.
For primary bibliographic entry see Field 4A.
W76-11877

RELATING ENVIRONMENTAL MODELING TO POLICY ISSUES AND DECISIONS,
Environmental Protection Agency, Washington, D. C.
E. H. Pechan, III, R. A. Luken, and H. M. Maynard.
Ecological Modelling (International Journal on Ecological Modelling and Engineering and Systems Ecology), Vol. 1, No. 1, p 49-65, May 1975. 7 tab, 21 ref.

Descriptors: *Pollution abatement, *Linear programming, *Computer models, *Ecology, Costs, Water, Air, Solid wastes, Thermal pollution, Decision making, Optimization, Computer programs, Equations, Mathematical models, Systems analysis.
Identifiers: Noise, Budgets.

Described is a linear program-based computer model which has been developed to identify the most effective spending patterns for environmental cleanup based on public preferences and spending limitations. The inputs to the model include the costs of removing each residual studied from its various sources. The objective function is the total 'value of removal.' The factor added for each residual consists of a value for the residual multiplied by the quantity or fraction removed. Results of the analysis relate to and support current and projected policy decisions by the U. S. Environmental Protection Agency (EPA) for air and water programs. In addition, the results of the analysis suggest that EPA undertake a redirection of the Nation's resources among residual control programs. (Bell-Cornell)
W76-11879

MATHEMATICAL MODELLING AND ENVIRONMENTAL DECISION-MAKING,
Department of Environment, Ottawa, Ont. Canada, Environmental Systems Branch.
For primary bibliographic entry see Field 6G.
W76-11880

MODELS IN WATER QUALITY PLANNING,
Karlsruhe Univ. (West Germany). Institut fuer Siedlungswasserwirtschaft.
For primary bibliographic entry see Field 5B.
W76-11882

ECOSYSTEM MODELING OF WATER-HYACINTH MANAGEMENT IN LAKE ALICE, FLORIDA,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
W. J. Mitsch.
Ecological Modelling (International Journal on Ecological Modelling and Engineering and Systems Ecology), Vol. 2, No. 1, p 69-89, March 1976. 13 fig, 2 tab, 35 ref.

Descriptors: *Ecosystems, *Water hyacinth, Management, *Lakes, *Simulation analysis, *Water quality control, Eutrophication, Mathematical models, Diversion, Water quality, Dissolved oxygen, Equations, Computers, Nitrogen, Systems analysis, *Florida.
Identifiers: *Lake Alice(Florida), Bottom detritus decomposer module, Prediction.

A mathematical model was developed for Lake Alice, a small, eutrophic, Karst-topography lake in Gainesville, Florida. The management of the floating aquatic plant, the waterhyacinth (Eichhornia crassipes) was considered one of the main objectives of the model. Simulated diversion of the treated sewage inflow reduced waterhyacinths by 50% or more. Dissolved oxygen remained low. Simulated diversion of the diluting effect of a heating plant effluent led to complete hyacinth takeover and much greater seasonal oscillations in the chemical parameters. Simulated hyacinth control caused the greatest dissolved oxygen fluctuations when spraying and periodic harvesting were tested at least with continuous harvesting. It was suggested that the above-mentioned diversions were shown to be ecologically unattractive even without considering the economic costs of alternatives to lake disposAl. (Bell-Cornell)

W76-11884

INTERNATIONAL MANAGEMENT OF THE GREAT LAKES-ST. LAWRENCE BASIN,
Western Ontario University, London, Canada, Department of Geography. University of Western Ontario, London. Dept. of Geography.
For primary bibliographic entry see Field 2H.
W76-11887

CITY--INDUSTRY TEAMWORK SOLVES CRITICAL WASTEWATER PROBLEM,
W. L. Forestell.
The American City Vol 88, p 57-59, July 1973. 3 p, 3 photo.

Descriptors: *Public utilities, *West Virginia, *Waste water disposal, *Waste water treatment, *Chemical wastes, *Sewage, Water pollution control, Pollution abatement, Water pollution sources, Waste disposal, Landfills, Waste water(Pollution), Sewage effluents, Water quality.

When the West Virginia Department of Natural Resources first initiated a program for upgrading the quality of the Kanawha River, both the City of South Charleston and the area's largest industry faced a problem of waste treatment. Instead of building separate facilities the city and Union Carbide Corporation cooperated in building a single plant capable of treating both domestic and industrial waste. Phase one of the project has been in operation since 1963, providing total primary and partial secondary treatment for wastewaters. Phase two, which began operation in 1968, provides total secondary treatment. Phase three is under construction and will be used only for industrial wastes. Initial costs were split between city and industry users with industry paying 90% of annual operating costs. Because the plant is city owned, however, Union Carbide has not become engaged in the legal entanglements a public utility usually encounters. It has nevertheless been in a position to exercise co-control with the city over operations. This cooperative experiment in waste treatment has achieved a marked increase in river water quality. (Comer-Florida)
W76-11891

THE SEPTIC TANK--A METHOD OF SEWAGE DISPOSAL FOR PRIVATE OR PUBLIC BUILDINGS,
Arizona State Dept. of Health Services, Phoenix.
For primary bibliographic entry see Field 5D.
W76-11892

MINIMUM REQUIREMENTS FOR DESIGN, SUBMISSION OF PLANS AND SPECIFICATIONS OF SEWAGE WORKS.
Arizona State Dept. of Health Services, Phoenix.
For primary bibliographic entry see Field 5D.
W76-11893

INTERIM REPORT, COOPERATIVE GRAYS HARBOR SURVEILLANCE PROGRAM-1970,
Washington State Dept. of Ecology, Olympia. Office of Technical Services.
For primary bibliographic entry see Field 5D.
W76-11894

REQUIRING POLLUTERS TO PAY FOR AQUATIC NATURAL RESOURCES DESTROYED BY OIL POLLUTION,
Office of the Judge Advocate General (Navy), Washington, D. C.
L. D. Wood.
Natural Resources Lawyer, Vol 8, p 545-609 (1976). 65 p, 300 ref.

Descriptors: *Oil pollution, *Legal aspects, *International law, *Oil spills, *Oil industry, International waters, Water pollution sources, Wastes, Disasters, Waste water, Waste water(Pollution), Oily water, Chemical wastes, United Nations, Water pollution.
Identifiers: *Oil Pollution Act, *Absolute liability.

The present system of civil liability for oil pollution is incomplete. Left partially or wholly unprotected are the private victim and the publics' recreation and natural resources. International uniformity can be gained by U. S. ratification of the Inter-Governmental Maritime Consultative Organization Liability and Fund Conventions. For domestic protection, a comprehensive U. S. Domestic Oil Pollution Liability and Compensation System should be enacted. These plans are discussed at great length here. Finally, any domestic plan must be both federal and uniform so as to prevent divergent state remedies. A primary theme is that civil liability for the full consequences of environmental harm is necessary. (Frank-Florida)
W76-11898

BIOLOGICAL CONTROL OF WATER WEEDS WITH PLANT PATHOGENS,
Florida Univ., Gainesville. Dept. of Plant Pathology.
For primary bibliographic entry see Field 4A.
W76-11904

ENCRUSTATION,
Plummer and McDannald Co., Galena, Ohio.
For primary bibliographic entry see Field 8G.
W76-11912

METHOD OF CONTROL OF LAND AND WATER USES IN THE COASTAL ZONE,
George Washington Univ., Washington, D. C.
For primary bibliographic entry see Field 6E.
W76-11922

EVALUATION OF A PNEUMATIC BARRIER FOR OIL CONTAINMENT,
Calspan Corp., Buffalo, N. Y.
J. M. Grace.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-249 361, $5.00 in paper copy, $3.00 in microfiche. Environmental Protection Agency, Environmental Protection Technology Series No. EPA-600/2-76-030, Febuary 1976. 79 p, 42 fig, 14 ref. WPRD 263-01-68.

Descriptors: *Oil pollution, *Rivers, *Water pollution control, Water quality control, *Barriers, *Mechanical equipment, Equipment, Water pollution control, *New York, *Separation techniques.
Identifiers: Pneumatic barriers, *Buffalo River(NY).

The development and evaluation of a pneumatic barrier for restraining the natural flow of surface oils in the Buffalo River is reported. The initial phase of the study involved laboratory experiments to evaluate the surface currents produced by buoyant air-water plumes which were formed by the injection of air through single and multiple orifices submerged below the water surface. Based upon the data obtained in the laboratory experiments, a full scale, prototype air barrier system was designed. This barrier system was built and installed in the river. A full scale test program was initiated in order to evaluate the performance of the barrier. Following the river test phase of the program, additional laboratory tests were conducted in a water channel facility to investigate the performance of a barrier system at higher currents and for different oil types than were available in the Buffalo River. It was determined that a pneumatic barrier could be an effective device for stopping the flow of surface oils for currents less than one foot per second. The actual limiting speed for a particular oil was a function of its viscosity and specific gravity. In no instance was any oil that was tested restrained in a current of more than 1.5 fps. (Sinha-OEIS)
W76-11923

FAST CURRENT OIL RESPONSE SYSTEM,
Tetradyne Corp., Richardson, Tex.
F. N. Mueller.
Available from the National Technical Information Service, Springfield, Va 22161, as AD/A-020 171, $5.00 in paper copy, $3.00 in microfiche. U. S. Coast Guard Final Report No. USCG-D-115-75, April 1975. 63 p, 26 fig, 8 tab, append. DOT-CG-40220-A.

Descriptors: *Oil spills, *Water quality control, *Pollution abatement, *Resources development, *Environmental effects, *Computer programs, Water resources, Barriers, Skimming, *Separation techniques.
Identifiers: Outer Continental Shelf, Booms, Oil skimmers, System design, Air boom tests.

A relative velocity can be imparted to a floating oil slick by moving an air jet across the surface of the water. If two long booms are arranged in a 'V' shape and moved across an oil slick, the oil will be blown into a concentrated strip which can then be collected with a suitable collector. The collector application in this study used a flow-through trough and a second air boom to skim the oil off the surface and into an oil concentrator. The complete unit was tested by the University of Michigan at speeds up to 7 ft/sec. The 'Vee' air booms did an excellent job of 'herding' the oil with efficiencies ranging from 100% at 1 ft/sec to 80% at 7 ft/sec. The development of the collector did not reach a point where good efficiencies could be obtained above 4 ft/sec. As a part of the program, a flow test tank was constructed with a test section 15 feet long, 4 feet wide, and 3 feet deep. The tank would give flow velocities up to approximately 8 ft/sec. (Sinha-OEIS)
W76-11928

DEVELOPMENT AND PRELIMINARY DESIGN OF AN EXPERIMENTAL PROTOTYPE FREE VORTEX OIL SKIMMER,
Scientific Associates, Inc., Santa Monica, Calif.
E. B. Nebeker, and S. E. Rodriguez.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-A020 174, $5.00 in paper copy, $3.00 in microfiche. U.S. Cast Guard Final Report No. USCG-D-152-75, June 1975. 93 p, 22 fig, 17 ref, append. DOT-CG-42732-A.

Descriptors: *Oil spills, *Oil pollution, *Skimming, *Pollution abatement, *Water quality control, Water pollution, Resources development, Vortices, *Separation techniques.
Identifiers: Outer Continental Shelf, *Oil skimmers.

An experimental prototype Free Vortex oil skimmer is described. Results indicate that the development of the Free Vortex has produced a skimmer system which possesses almost all of the performance characteristics usually considered desirable in an oil skimmer. The system is particularly applicable to the operating conditions of: oil films 2-inch thick and less, operation while stationary and in currents up to 0.75 knots, and severe Sea State 4 waves. The utility of this concept is not limited to these particular conditions but includes many other situations and operating modes. The Free Vortex oil skimmer, with a maximum oil recovery rate of 250 to 300 gpm and fitted with a comminutor/macerator to process debris, will weigh about 1300 pounds. The largest dimension is 12 feet when deployed and can be collapsed to 6 feet for transportation. Objectives of the development portion of this program are to develop and improve surface oil capture, vortex generation and vortex-inflow blending, and recovery oil fraction. Results showed that upwell behavior can be easily eliminated, vortex genera-

tion was improved by blending the appropriate flow field more smoothly, and oil fraction was unexpectedly good: at a recovery rate of 120 gpm, about 100% oil was recovered at 1/4-inch and greater. (Sinha-OEIS)
W76-11929

DEVELOPMENT OF BUOY MOUNTED HYDROCARBON VAPOR SENSORS FOR USE IN LOCAL AREA POLLUTION SURVEILLANCE SYSTEMS,
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5A.
W76-11930

SURVEY STUDY OF TECHNIQUES TO PREVENT OR REDUCE DISCHARGES OF HAZARDOUS CHEMICALS,
Battelle Columbus Labs., Ohio.
N. C. Henderson, S. Srinivasan, and J. A. Henkener.
Available from the National Technical Information Service, Springfield, Va 22161, as AD/A-020 173, $5.00 in paper copy, $3.00 in microfiche. U.S. Coast Guard Report No. USCG-D-184-75, August 1975. 84 p, 26 fig, 7 tab, 6 ref. DOT-CG-23223-A.

Descriptors: *Hazards, *Transportation, Pollutants, *Chemical wastes, *Poisons, *Pollution abatement, *Accidents, *Public health, *Water pollution, *Water quality control, Equipment.
Identifiers: *Hazardous materials, Cargo, Spills, Spill prevention.

A program was conducted to investigate both off-the-shelf and conceptual techniques for preventing or reducing the discharge of hazardous chemicals from an endangered marine vessel or to stop or reduce the discharge from an actual leak. First, approximately 50 methods and/or types of equipment were identified which involved (1) patching or plugging a leak, (2) cargo off-loading, (3) cargo immobilization, or (4) enclosure/containment of the cargo. Next, the compatibility of each of the concepts and equipment with the CHRIS list of hazardous chemicals was determined on a relative basis. This effort was primarily concerned with adverse material behavior in contact with each CHRIS chemical; however, temperature effects, explosive problems, viscosity, and density were also important parameters depending on the particular concept under consideration. The concepts were then evaluated on the basis of their relative chemical compatibility in combination with overall functionality (e. g. usefulness) and the various types of onsite operations to which they applied. Based on this evaluation, a number of concepts (both off-the-shelf and conceptual) were identified as superior with concurrent recommendations for acquisition or development. (Sinha-OEIS)
W76-11931

PRELIMINARY RESULTS WITH A PILOT PLANT WASTE RECYCLING MARINE-AQUACULTURE SYSTEM,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5D.
W76-11932

A COMPUTER SIMULATION TECHNIQUE FOR OIL SPILLS OFF THE NEW JERSEY-DELAWARE COASTLINE,
Coast Guard Research and Development Center, Groton, Conn.
For primary bibliographic entry see Field 5B.
W76-11940

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOLUME 1.
Council on Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 6G.
W76-11947

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOLUME 2, (APPENODICES).
Council on Environmental Quality, Washington, D. C.
For primary bibliographic entry see Field 6G.
W76-11948

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL. 3, THE EFFECT OF NATURAL PHENOMENA ON OCS GAS AND OIL DEVELOPMENT.
Tetra Tech, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 6G.
W76-11949

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 3, TOWARD RESOLVING PROBLEMS IN OUTER CONTINENTAL SHELF TECHNOLOGY.
Resources for the Future, Inc., Washington, D. C.
For primary bibliographic entry see Field 6G.
W76-11950

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 4, POTENTIAL ONSHORE EFFECTS OF OIL AND GAS PRODUCTION ON THE ATLANTIC AND GULF OF ALASKA OUTER CONTINENTAL SHELF.
Resource Planning Associates, Inc., Washington, D. C.
For primary bibliographic entry see Field 6G.
W76-11951

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 5, POTENTIAL BIOLOGICAL EFFECTS OF HYPOTHETICAL OIL DISCHARGES IN THE ATLANTIC COAST AND GULF OF ALASKA.
Massachusetts Inst. of Tech., Cambridge, Mass.
For primary bibliographic entry see Field 6G.
W76-11952

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 5, SIMULATION OF HYPOTHETICAL OFFSHORE PETROLEUM DEVELOPMENTS.
Massachusetts Inst. of Tech., Cambridge, Mass.
For primary bibliographic entry see Field 6G.
W76-11953

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 5, ANALYSIS OF OIL SPILL STATISTICS.
Massachusetts Inst. of Tech., Cambridge, Mass.
For primary bibliographic entry see Field 6G.
W76-11954

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 5. OIL SPILL TRAJECTORY STUDIES FOR ATLANTIC COAST AND GULF OF ALASKA.
Massachusetts Inst. of Tech., Cambridge, Mass.
For primary bibliographic entry see Field 6G.
W76-11955

OPTIMIZATION OF WATER RESOURCES DEVELOPMENT PROJECTS IN CASE OF INADEQUATE HYDROLOGIC DATA,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 6A.
W76-11971

COMPENSATION FOR OIL POLLUTION AT SEA: AN INSURANCE APPROACH,
San Diego Univ., Calif. School of Law.
C. F. Goria.
Federation of Insurance Counsel Quarterly, Vol 26, p 3-26 (Fall 1975). 24 p, 133 ref.

Descriptors: *Insurance, *Oil spills, *Water pollution sources, *Oil wastes, *Waste water(Pollution), Waste water disposal, Water pollution, Chemical wastes, Oil industry, Oily water, Ships, International law, International commissions, Civil law.

Monetary damages from oil spill accidents, including cleanup costs and private claims, are inequitably distributed under present liability principles. The author reviews several national approaches to insurance and finds them inadequate, mainly due to extreme limitations of liability. The 1969 Civil Liability Convention, the International Compensation Fund, the Tanker Owners Voluntary Agreement Concerning Liability for Oil Pollution, and the Contract Regarding an Interim Supplement to Tanker Liability for Oil Pollution all go a long way towards but do not protect private claims. The author suggests the deletion of all liability limits on all but private claims. Private claims should be handled by the International Compensation Fund. Loss distribution should involve the shipping industry through higher premiums, the oil companies through higher shipping costs, and the consumer through higher prices. (Frank-Florida)
W76-11975

WETLAND'S RELUCTANT CHAMPION: THE CORPS TAKES A FRESH LOOK AT 'NAVIGABLE WATERS',
Lewis and Clark Coll., Portland, Oreg. Northwestern School of Law.
For primary bibliographic entry see Field 4A.
W76-11976

ENVIRONMENTAL LAW--STATUTORY INTERPRETATION--THE ENVIRONMENTAL PROTECTION AGENCY ENTERS THE NUCLEAR AGE--COLORADO PUBLIC INTEREST RESEARCH GROUP, INC V TRAINS 507 F2D 743 (10TH CIR 1974),
J. A. Christopher.
Suffolk University Law Review, Vol IX, p 1512-23 (1975). 12 p.

Descriptors: *Federal Water Pollution Control Act, *Administrative agencies, *Nuclear wastes, *Radioactive wastes, *Nuclear power plants, Water pollution, Federal government, Regulation, Colorado, United States, Rivers, Navigable waters, Nuclear energy, Nuclear reactors, Radiation, Radioactivity, Permits.
Identifiers: *FWPCA Amendments of 1972.

The question of whether the discharge of radioactive waste into navigable waters should be regulated by the Environmental Protection Agency or the Atomic Energy Commission (AEC) was decided by a Federal Court of Appeals in 1974, when a citizens' group brought suit to compel the EPA to set limitations on the discharge of radioactive materials from two nuclear facilities into Colorado rivers. The citizens' group contended that the Federal Water Pollution Control Act Amendments of 1972 clearly place the responsibility for regula-

tion of any pollutants on the Environmental Protection Agency (EPA). The EPA, however, argued that the legislative history of the Amendments indicated Congress' intent to exclude special nuclear materials, and that the Atomic Energy Act of 1954 gave the AEC exclusive power over such matter. The Court of Appeals for the Tenth Circuit held that the term 'pollution' as used in the Amendments is unambiguous, and does not exclude any radioactive materials; furthermore, the Atomic Energy Act should not be interpreted so as to divest the EPA from primary responsibility over regulation of any pollution of navigable waters. The court's rationale and the possible impact of the decision are discussed in detail. (Sloan-Florida)
W76-11979

NITRATE POLLUTION AND THE CALIFORNIA ENVIRONMENTAL QUALITY ACT: THE APPROPRIATE SOLUTION TO A NEGLECTED PROBLEM,
L. R. Skidmore, III.
California Western Law Review, Vol. 12, No. 1, p. 122-41 (1975). 20 p, 1 chart.

Descriptors: *California, *Permits, *Nitrates, *Agricultural runoff, *Water pollution control, Federal government, Legislation, Legal aspects, Regulation, Pollution, Administrative agencies, Federal Water Pollution Control Act, Governmental interrelations, State governments, Environmental control, Projects, Local governments, Pollutant identification, Water pollution, Environmental effects.
Identifiers: *National Environmental Policy Act, *California Environmental Quality Act, Environmental impact statement.

The Congress, the Federal Courts, the California legislature and state agencies have all failed to regulate nitrate pollution. The failure to regulate this important source of agricultural groundwater pollution has resulted in the degradation of agricultural product, reduced milk production, and the contamination of drinking water. This comment suggests the viability of applying the California Environmental Quality Act (CEQA) to solve the nitrate pollution problems in California. This would be accomplished through the registration and licensing of fertilizers. CEQA will be applied to those activities sought to be licensed which have discretionary governmental approval as 'statutory projects'. In addition, the activity must have significant and positive environmental effects in order to be licensed. If these factors are met, a Draft Environmental Impact Report (EIR) containing detailed descriptions of the fertilizer registration and licensing project must be prepared and accepted. CEQA will be applied through existing administrative procedures within the California Department of Agriculture. (Hadoulias-Florida)
W76-11981

PROTECTION OF THE MARINE ENVIRONMENT,
National Petroleum Council, Washington, D. C. Committee on Ocean Petroleum Resources.
C. C. Smith, Jr, L. W. Finlay, and M. S. McKnight.
Natural Resources Lawyer, Vol 8, No 3, p 511-33 (1975). 25 p, 1 tab.

Descriptors: *Oil industry, *Oil spills, *Law of the sea, *International commissions, *Water pollution sources, Oil, Oil wastes, Water pollution, Oil pollution, Oceans, Conservation, Sea water, Water pollution control, Legal aspects, Ecology, Pollutants, International law, Water law, Exploration, Effluents, Jurisdiction, Regulation.
Identifiers: *Marine pollution, Oceanic ecosystem, Environmental impact.

Since 1968 the National Petroleum Council has undertaken four studies to assist the government in formulating policies in preparation for the United Nations Law of the Sea Treaty negotiations. This article is an extract of one such study dealing with marine oil pollution. Marine petroleum pollution has four major sources. Of these the largest source is land based activities, which account for about 55% of sea pollution. Regulation in this area, however, is primarily a national responsibility beyond the treaty scope. The pollution resulting from natural phenomena is also beyond treaty scope and not discussed. The remaining pollution sources are vessels and offshore production. Of the two, vessel pollution is by far the greater; as a result, several international conventions and informal agreements already exist relating to vessel design, waste treatment, and discharge limitations. The Inter Governmental Maritime Consultative Organization (IMCO) is largely responsible for the improvements. The National Petroleum Council recommends that, because of its past success and experience, IMCO be named as administrative agent for any new international standards. (Comer-Florida)
W76-11982

THE SETTLEMENT OF INTERNATIONAL ENVIRONMENTAL DISPUTES,
Wisconsin Univ., Madison. School of Law.
For primary bibliographic entry see Field 6E.
W76-11983

OIL, SUPER-SHIPS AND THE OCEANS,
J. Frye.
Oceans, Vol. 74, p. 48-55, Jan. 1974. 8 p, 3 photo, 1 dwg, 1 tab.

Descriptors: *Ships, *Oil spills, *Design standards, *Costs, Water pollution control, Transportation, Washington, California, Oil, Oil pollution, Water pollution, Water quality, Water quality control, Environmental effects, Port authorities, Planning, Pollution abatement, Research equipment, Energy, Research priorities, Water quality act, Bacteria, Coasts.

The era of superships has arrived. Supertankers transporting petroleum are expected to present great water pollution problems. Consequently, there has been growing public resistance to the construction of port facilities to accomodate these great ships. The oil companies have responded by promising to pay for various oil spill prevention measures if new shore facilities are approved. The institute for Water Resources ordered studies analyzing the potential water pollution problems from the supertankers. The results of these studies suggest that further research be conducted to explore methods of reducing the possible pollution impact of tankers on coastal waters and shores. Also examined are various water pollution and oil pollution prevention acts having provisions governing tanker design and oil spill control methods, and recent Navy efforts at developing strains of bacteria which consume oil. (Hadoulias-Florida)
W76-11985

THE INTRACOASTAL WATERWAY: AN ECOLOGICAL PERSPECTIVE,
Florida Atlantic Univ., Boca Raton. Dept. of Biological Sciences.
G. A. Marsh.
Florida Environmental and Urban Issues, Vol. 11, No. 2, p. 6-7, 13-15(1974). 4 p, 1 photo.

Descriptors: *Florida, *Ecology, *Water quality control, *Human population, *Canals, Recreation, Southeast U. S., Projects, Biota, Biological communities, Dominant organisms, Protection, Water resources, Pollution, Water pollution, Canals, Project planning, Water management(Applied), Mangrove swamps, Water quality, Water policy, Water treatment, Water pollution sources, Waste disposal, Navigation, Natural resources.
Identifiers: *Intracoastal Waterway, *Water Quality Management Plan.

The Intracoastal Waterway (ICWW) connects a series of inland marine water bodies of the Gold Coast and provides a protected boating passage linking the coastal municipalities. It also serves various recreational, drainage and waste disposal needs of Palm Beach, Broward and Dade Counties. Burgeoning population growth has severely lowered water quality in these and other counties. In addition, continuing demand for waterfront acreage has devastated natural shoreline vegetation along inland marine waters. Growing populations have also resulted in sewage wastes entering the inland marine waters. To counteract this condition, centralized collection and treatment systems using non-polluting disposal techniques must be developed. In addition to sewage wastes, other sources of pollution include partially treated domestic wastes, surface runoff from agricultural and urban areas, and decayed organic matter from water hyacinths. The demand for finger-canal developments has resulted in pesticides, grass and shrubbery clippings and other wastes accumulating and decomposing within the canal system. The development of waterfront homesites has also resulted in the devastation of Palm Beach County's mangrove habitat, an area critically important to the coastal ecosystem. Hopefully, implementation of the recently adopted Water Quality Management Plan will improve the quality of the surface waters within Palm Beach County. (Hadoulias-Florida)
W76-11986

EFFLUENT LIMITATIONS GUIDELINES FOR EXISTING SOURCES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS FOR NEW SOURCES FOR THE PAVING AND ROOFING MATERIALS (TARS AND ASPHALT) POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D. C.
Federal Register, Vol 40, No 143, p 31190-95, July 24, 1975. 6 p, 11 tab.

Descriptors: *Asphalt, *Standards, *Effluents, *Treatment facilities, *Roofing materials, Paving, Asphaltic concrete, Construction materials, Federal Water Pollution Control Act, Water pollution, Water pollution sources, Water quality, Waste water treatment, Pollutants, Regulation, Administrative agencies, Federal government.
Identifiers: *Administrative regulations, *FWPCA Amendments of 1972.

Pursuant to the authority of the Federal Water Pollution Control Act, the Environmental Protection Agency has proposed effluent limitations and guidelines for existing sources and standards of performance for new sources in the paving and roofing materials category. Tables are given setting forth in both English and metric units the standards for each subcategory. Limitations are specified for TSS, pH, and oil and grease. The subcategories covered by the regulation are asphalt emulsion, asphalt concrete, asphalt roofing, and linoleum and printed asphalt felt. The inflationary impact of the proposed regulation is considered to be insignificant. (Capehart-Florida)
W76-11989

COMPREHENSIVE OIL POLLUTION LIABILITY AND COMPENSATION ACT OF 1975.
U. S. Code Cong and Admin News, p 1512, 1975. 1 p.

Descriptors: *Remedie, *Compensation, *Oil spills, *Federal jurisdiction, Resources development, Legislation, Federal-state water rights, Conflicts, Resources, State jurisdiction, Damages, High seas, Regulation, Administration, Water law, Environmental effects, Oil pollution, Water pollution, Oil wells, Oil industry.
Identifiers: *Standing(Legal), *Sovereign immunity, *Absolute liability, Coastal waters, Coastal zone management, Territorial seas(Jurisdiction).

On July 9th, President Ford submitted to Congress a special message to accompany his proposed Comprehensive Oil Pollution Liability and Compensation Act of 1975. This legislation, according to the President, would establish a comprehensive and uniform system for fixing liability and settling claims for oil pollution damages in United States waters and coastlines. The proposal would also implement two international conventions dealing with oil pollution by tankers on the high seas. To prevent further oil pollution, the legislation would establish strict liability for pollution damages from identifiable sources and would provide economic incentives to operators to prevent oil spills. In addition to defining liability for oil spills, it would establish a uniform system for settling claims and for assuring that none will go uncompensated, while at the same time replacing a patchwork of overlapping and sometimes conflicting Federal and State laws. (Reinders-Florida)
W76-11990

REVIEW OF PROJECTS AFFECTING SOLE SOURCE AQUIFERS, EDWARDS UNDERGROUND RESERVOIR, TEXAS AREA; INTERIM PROJECT REVIEW GUIDELINES.
Environmental Protection Agency, Washington, D. C.
Federal Register, Vol 40, No 242, p 58292-94, December 16, 1975. 3 p.

Descriptors: *Aquifers, *Potable water, *Public health, *Texas, *Water sources, Financing, Government finance, Reservoirs, Recharge, Toxicity, Water quality, Federal government, River basins, Groundwater recharge, Groundwater resources, Underground storage, Water pollution, Wastes, Projects, Project planning, Federal project policy, Administrative agencies, Regulation.
Identifiers: Administrative regulations, Environmental impact statement, Edwards Underground Reservoir(Tex).

Pursuant to its authority under the Safe Drinking Water Act, the Environmental Protection Agency (EPA) has determined that the Edwards Underground Reservoir is a principal source of drinking water for the San Antonio, Texas, area. Since pollution of this aquifer would create a significant public health hazard, federal funds will not be provided for any project which might contaminate the aquifer through the recharge zone. The EPA has established guidelines for review of major, federally-assisted programs or actions which may affect the water quality of the aquifer. Provisions are made for initiating review of a project, for giving notice of the review to the originating federal agency and to the public, and for holding public hearings on the projects. Factors to be considered in the project review include the following: the extent of the health hazard; preventive or mitigating measures that could be taken; state or local controls over the release of contaminants; expected benefits of the project; and, the cumulative impact of the project. (Capehart-Florida)
W76-11991

INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY.
Environmental Protection Agency,Washington, D. C.
Federal Register, Vol. 40, No. 100, p. 22402-23, May 22, 1975. 22 p, 15 tab.

Descriptors: *Inorganic compounds, *Federal Water Pollution Control Act, *Pollutant identification, *Legislation, *Chemical wastes, Technology, Pollutants, Standards, Analytical techniques, Chemical analysis, Water pollution, Chemicals, Pollution abatement, Legal aspects, Legislation, Qualitative analysis, Chemcontrol, Federal government, Administration, Administrative agencies, Standards, Classification.
Identifiers: *FWPCA Amendments of 1972, *Point sources(Pollution).

Pursuant to the authority of the Federal Water Pollution Control Act, the Environmental Protection Agency (EPA) has proposed effluent limitations and guidelines for existing sources and standards of performance and pretreatment standards for existing and new sources in the inorganic chemical manufacturing point source category. Section 306 of the Act requires pollutant discharge control through application of the best available technology. The point source category was studied to determine whether separate limitations are appropriate for different segments within the category. In addition, the control and treatment technologies existing within each segment were identified and the information evaluated. Subsequently, the significant inorganic products segment of the inorganic chemicals manufacturing category was divided into forty-one discrete sub-categories consistent with the specific chemicals produced. Discussion of listed process wastes water pollutants generated by the manufacture of significant inorganic products is included. (Hadoulias-Florida)
W76-11992

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM: SEPARATE STORM SEWERS.
Environmental Protection Agency, Washington, D. C.
Federal Register, Vol 40, No 235, p 56932-36, December 5, 1975. 5 p.

Descriptors: *Permits, *Storm drains, *Urban drainage, *Storm runoff, Pollutants, Regulation, Agricultural runoff, Industrial wastes, Standards, Effluents, Structures, Pipes, Surface runoff, Cities, Sewers, Separated sewers, Urbanization, Judicial decisions, Administrative agencies, Federal government, State governments, Federal Water Pollution Control Act.
Identifiers: *Administrative regulations.

As directed by order of the federal district court, the Environmental Protection Agency (EPA) has proposed regulations extending the National Pollutant Discharge Elimination System (NPDES) permit system to include point sources in the separate storm sewer category. This category had previously been exempted since the EPA considers that runoff sources are nonpoint in nature and more properly regulated under the Federal Water Pollution Control Act. The proposed regulations define a separate storm sewer as a publicly-owned, urban area pipe system used for the purpose of collecting storm runoff uncontaminated by industrial or commercial wastes. The regulations authorize the discharge of pollutants from separate storm sewers subject to a permit procedure and other requirements which may be prescribed in future regulations. In addition, a discharger may be required to obtain a conventional NPDES permit at anytime. (Capehart-Florida)
W76-11993

OFFSHORE SEGMENT OF THE OIL AND GAS EXTRACTION POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D. C.
Federal Register, Vol 40, No 179, p 42572-77, September 15, 1975. 6 p, 5 tab.

Descriptors: *Standards, *Effluents, *Water pollution sources, *Federal Water Pollution Control Act, Drilling, Oil, Natural gas, Mud, Sands, Administration, Regulation, Administrative agencies, Oceans, Waste water(Pollution), Water pollution, Federal government, Drilling fluids, Pollutants.
Identifiers: *Point sources(Pollution), Administrative regulations, Offshore oil drilling.

Pursuant to the Federal Water Pollution Control Act, the Environmental Protection Agency (EPA) is publishing regulations providing guidelines for effluent limitations and pretreatment standards for existing sources and pretreatment standards and standards of performance for new sources in the near-offshore and far-offshore sub-categories of the offshore segment of the oil and gas extraction point source category. Tables establishing the quantity or quality of pollutants or pollutant properties which may be discharged by a point source subject to specified provisions are included. The pollutant sources tabulated are deck drainage, drilling muds, drill cuttings, well treatment, sanitary, domestic, produced sand and produced water. (Capehart-Florida)
W76-11994

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION -- OVERSIGHT HEARINGS.
For primary bibliographic entry see Field 6E.
W76-11999

THE FREEDOM OF NAVIGATION AND THE PROBLEM OF POLLUTION OF THE MARINE ENVIRONMENT,
Gosudarstvennyi Proektno-Izyskatelskii i Nauchno-Issledovatelskii Institut Morskogo Transporta 'Soyuzmorniiproekt', Moscow (USSR).
V. A. Kiselev.
Georgia Journal of International and Comparative Law, Vol 6, p 93-106 (1976). 14 p, 75 ref.

Descriptors: *International law, *United Nations, *Water pollution control, *Oceans, *Law of the sea, Navigation, Water pollution, Marine biology, Legal aspects, Oil spills, Oil wastes, Water policy, Foreign countries, International commissions.

The law of the sea with regard to pollution prevention and liability is changing rapidly. Standards for the prevention of pollution from vessels have been adopted, but standards concerning a ship's construction and equipment should also be adopted on the international level. For their further protection, coastal states should be provided with some rights for combatting pollution within a zone of the high sea bordering on their territorial waters. It would also be helpful if divergent rules and standards concerning pollution prevention among coastal states could be unified for reasons of protection and enforcement. (Frank-Florida)
W76-12010

LIABILITY FOR MARINE ENVIRONMENT POLLUTION DAMAGE IN CONTEMPORARY INTERNATIONAL SEA LAW,
Gosudarstvennyi Proektno-Izyskatelskii i Nauchno-Issledovatelskii Institut Morskogo Transporta 'Soyuzmorniiproekt', Moscow (USSR).
A. L. Makovsky.
Georgia Journal of International and Comparative Law, Vol 6, p 59-71 (1976). 13 p. 73 ref.

Descriptors: *International commissions, *Treaties, *Law of the sea, *Marine biology, Oceans, Oil wastes, Oil spills, Water pollution, Sources, Water pollution treatment, Fish populations, United Nations, *Water pollution control, Pollutants, Fishkill, Compensation, International law.

Examined here are the various international conventions dealing with liability for harm to the marine environment. They include conventions providing protection against oil and nuclear waste, as well as against fishkill. A form of international tort law forms the basis for these conventions. In the Third UN Conference on the Law of the Sea, efforts have been made to include and refine these liability principles into a new law of the sea. Draft articles are presented from the U.S., Australia, Norway, Germany, Canada and other countries. The concept of state liability is only just beginning to take hold. (Frank-Florida)
W76-12011

RESPONSIBILITY AND LIABILITY FOR HARM TO THE MARINE ENVIRONMENT,
International Inst. for Environment and Development, Washington, D.C. North American Office.
R. E. Stein.
Georgia Journal of International and Comparative Law, Vol 6, p 41-57 (1976). 17 p, 76 ref.

Descriptors: *International commissions, *International law, *Marine biology, *Oceans, Oil wastes, Oil spills, Water pollution sources, Water pollution treatment, Fish populations, United Nations, *Water pollution control, Pollutants, Fishkill, Compensation, Water law.

Harm to the marine environment is not being dealt with sufficiently at present. No catalyst exists that would push nations into preventing marine harm or compensating its victims. Transport discharges and wastes, dumping and fish depletion are some of the harms sought to be prevented. Existing control measures exist, and are enumerated here, but they are inadequate. Recommendations are made for new measures to prevent marine harm. (Frank-Florida)
W76-12012

ZERO DISCHARGE: NATIONAL GOAL OR NATIONAL CALAMITY,
Allied Chemical Corp., New York.
J. T. Connor.
Vital Speeches of the Day, Vol 39, p 290-93, March 1, 1972. 4 p.

Descriptors: *Waste treatment, *Water quality standards, Cost-benefit analysis, *Economic impact, *Economic feasibility, Feasibility, Social values, Water policy, Regulation, Water quality control, Water pollution control, Pollution abatement.

A goal of zero discharge of pollutants into the nation's waters, the goal set by the Muskie Bill proposed in 1971, may have financial and human resource costs too high to pay. This speech by the chairman of the board of Allied Chemical Corporation discusses the possible costs and effects of such a goal. Whatever pollution control costs are incurred will eventually be paid by consumers and tax payers. Therefore, arbitrary goals should not be set without careful evaluation. Total pollution control has been conservatively estimated to cost more than 90 billion dollars. Some estimates run as high as 2 or 3 trillion dollars. The question to be answered is whether 100% control is necessary and desirable in the face of such costs. Lesser standards should be considered. A plan to project 100% control while allowing for 'mid-course correction' does not reduce the cost damage but adds the additional problem of passing laws that cannot be obeyed. Before Congress establishes control standards, it must set attainable, balanced goals. (Comer-Florida)
W76-12014

THE ROLE OF NORTH AMERICAN DEEP WATER PORTS,
G. A. Regan.
Vital Speeches of the Day, Vol. 39, p. 455-458, March 26, 1973. 4 p.

Descriptors: *North America, *Oil spills, *Oil industry, *Ships, *Harbors, *Canada, Import, Economic feasibility, Economic efficiency, Employment, Anchors, Naval architecture, Engineering, Energy, Navigation, Deep water.
Identifiers: *Coastal zone management, *Deepwater ports, *Nova Scotia.

Because Americans are consuming their own available fuel at a very high rate, imported oil is essential to the American economy. Projections estimate that by 1985 as much as 15 million barrels will have to be imported every day. The United States, however, has no ports capable of handling the very large crude carriers (VLCCs) which are the most economic transportation means. Since no American ports are even capable of alteration to suit increased needs, this article proposes use of Canadian, Bahama and Carribean ports for U.S. oil imports. Canadian ports are close enough to the heavy oil use areas of the northeastern U. S. to present a viable alternative. Moreover, Canadian ports are already capable of receiving VLCCs. Should the U.S. agree to use of Canadian ports, however, it must recognize that the Canadian government and people may not be willing to assume spillage risks for mere transportation income. The Canadian government will also likely require the construction of oil refineries which could provide Canadian oil workers with jobs previously performed by American workers in U.S. located refineries. (Comer-Florida)
W76-12015

SALT MARSHES-ECOSYSTEMS IN DANGER,
Cape Cod Museum of Natural History, Brewster, Mass.
J. Hay.
National Parks and Conservation Magazine, Vol 48, p 16-21 March 1974. 6 p, 1 illus, 11 photo.

Descriptors: *Marshes, *Coastal marshes, *Wetlands, *Estuarine environment, *Dredging, *Salt marshes, Tidal marshes, Waterfowl, Shellfish, Commercial shellfish, Pollution, Commercial fishing, Aquatic life, Aquatic environment, Sport fishing, Estuarine fisheries, Wildlife, Pollution.
Identifiers: *Coastal wetlands, *Dredge and fill operations.

There is an urgent need to strengthen laws for the protection of existing wetlands and for increasing general awareness of the unique value of wetlands. Commercial waterfront developments currently being undertaken for immediate economic gain often destroy critically needed marshlands. The result is that tidal flow is reduced and the marshes lose their ability to sustain living organisms. This leads to a decrease in the numbers and kinds of larger creatures which feed on these organisms. This decrease affects not only wildlife, which are thought of as aesthetically enriching, but also saltwater fish of considerable commercial value. The sport fishing and shellfish industries are also affected since they are dependent on spawning grounds in the coastal wetlands. Protection of the coastal areas may be accomplished through the passage of regulatory legislation and, when sufficient funds are availabl, through the outright acquisition of marshlands through state and local governments. (Sloan-Florida)
W76-12016

SUPERPORTS: THE NEED IS COMING,
Federal Maritime Commission, Washington, D. C.
A. C. Barrett.
Vital Speeches of the Day, Vol 40, p 712-714, August 22, 1974. 3 p.

Descriptors: *Oil spills, *Offshore platforms, *Harbors, *Oil industry, *Ships, Transportation, Economics, Economic efficiency, Economic justification, Water pollution sources, Foreign trade, Import, Legislation, Coastal structures.
Identifiers: Coastal waters, Coastal zone management, Absolute liability.

While the largest tanker at the end of World War II was 18,000 tons, today's tankers range up to 100,000 tons. Unfortunately, the United States is the only major world power unable to accommodate these supertankers. Explored here is the desirability of constructing huge offshore superports capable of handling supertankers. Environmentalists, actively opposing superport construction in the Atlantic, are correct in noting that the risk of oil spill from supertankers is unknown. These tankers are of recent invention and their ability to survive storms and other catastrophes has not been tested. Nevertheless, despite the fact that a spill from such a huge ship could be disastrous, economic factors of effluent oil transportation weigh in favor of supertankers and superports. In addition, an oil receiving facility located well off the coasts would reduce the threat of collision and vessel groundings. As to potential damages resulting from spills, recent congressional proposals provide for a hundred million dollar per accident fund to provide compensation on a no fault basis. (Comer-Florida)
W76-12017

HOW MODERN TECHNOLOGY IS ENDANGERING OUR LIVES: OCEAN POLLUTION,
J. E. J. Piccard.
Vital Speeches of the Day, Vol 39, p 179-182, December 3, 1972. 4 p.

Descriptors: *Water pollution effects, *Marine microorganisms, *Food abundance, *Phytoplankton, *Water quality, Water pollution control, Aquatic microbiology, Aquatic environment, Pollutant identification, International law, Air pollution, Soil contamination, Thermal pollution, Balance of nature, Environmental effects, Pesticides, International commissions.

Besides producing about 20% of the world's food, the sea contributes millions of gallons of oxygen to the atmosphere. Sea life, however, is in severe danger because of pollution, not only of the oceans but also of the land and air. This article proposes that the preservation of sea organisms requires both governmental and individual action. Private individuals must realize that biological equilibrium requires a 50% reduction of the birth rate, a 75% reduction of resource exploitation, a 20% reduction of food production and a 50% reduction of pollution. Governments must severely reduce or stop pollution of rivers, ban ocean dumping, control direct and indirect sewerage pollution of seas, replace long life pesticides with short life ones, and require more efficient automobile engines. The most efficient and possibly the only realistic governmental control must be a global authority. Reduction of ocean pollution requires reduction of all pollution because the ocean is the ultimate receiver. Examples from London, Zurich and Pittsburg prove that total pollution reduction is possible in a limited time. (Comer-Florida)
W76-12018

PREPARING TO TAKE THE PLUNGE (ATLANTIC OFFSHORE OIL),
P. J. Bernstein.
The Nation, Vol. 217, p 203-207, September 10, 1973. 5 p, 1 map.

Descriptors: *Water resources development, *Offshore platforms, *Oil fields, *Oil spills, *Atlantic Ocean, *Continental Shelf, Coastal structures, Coastal marshes, Commercial fishing, Red tide, Water pollution sources, Water pollution effects, Research priorities, Research and development, Oily water, Oil reservoirs.
Identifiers: *Coastal zone management, Coastal waters, Contiguous zone.

A recent survey indicates that the Atlantic continental shelf contains massive sedimentary deposits. These deposits may contain oil in quantities exceeding the world's largest oil field. Offshore drilling, therefore, seems to be a mere matter of time. However, environmental issues related to offshore drilling are as yet unresolved. This article discusses some of the issues pertaining to offshore drilling. Oil spillage is of utmost concern. The American Petroleum Institute admits that on site spillage is a possibility. The real concern of environmentalists, however, is the chronic pipeline leaks and accidents of transfer and onshore facilities. It is this type of spillage that results in the worst oil slicks. Estimates indicate that already spilled oil, if spread evenly throughout the oceans, would form a visible slick over the entire area. Other problems with offshore

drilling include development of coastline areas with corresponding loss of natural beauty and injuries to fishing industries. The New England fishing industry asserts that it could not survive Atlantic drilling. Despite these problems and the recent complete halt of ocean research, drilling seems inevitable. (Comer-Florida)
W76-12019

THE BATTLE OF LAKE SUPERIOR: RESERVE MINING'S BIG SEWER,
Q. Dadisman.
The Nation, Vol 218, p 592-594, May 11, 1974. 3 p, 1 map.

Descriptors: *Minnesota, *Lake Superior, *Industrial wastes, *Water pollution sources, *Asbestos, Potable water, Effluents, Judicial decisions, Mining, Air pollution, Administrative agencies, Standards, Density currents, Lakes, Economic impact, Public health, Social aspects, State governments, Waste disposal, Water quality, Nickel.
Identifiers: Wilderness areas.

After the conclusion of a federal-state enforcement conference on cleaning up Lake Superior, the Environmental Protection Agency (EPA) issued a 180-day order against a taconite procesing mill which had been disposing of taconite tailings into the lake. At the end of the 180-day period, the EPA brought suit in federal court to stop the discharge into the lake. The court, after hearing considerable expert testimony from health officials, found that asbestos fibers, known to be a constituent of taconite, represented a substantial public health hazard. The court thus ordered the plant and mine shut down until the company complied with Minnesota air and water quality standards. This action was taken despite claims by the company that 96,200 jobs would be threatened. The court also ordered the Corps of Engineers to provide safe drinking water for communities drawing water from the lake. (Capehart-Florida)
W76-12020

OCEANS, TECHNOLOGY AND LAW.
Akademiya Nauk SSSR, Moscow. Inst. of State and Law.
For primary bibliographic entry see Field 6E.
W76-12025

INTERNATIONAL-LEGAL PROTECTION OF THE SEAS FROM POLLUTION,
Akademiya Nauk SSSR, Moscow. Inst. of State and Law.
For primary bibliographic entry see Field 6E.
W76-12034

INTERNATIONAL-LEGAL PROTECTION OF THE LIVING RESOURCES OF THE SEA,
Akademiya Nauk SSSR, Moscow. Inst. of State and Law.
For primary bibliographic entry see Field 6E.
W76-12036

WORLD ENVIRONMENTAL QUALITY.
Department of State, Washington, D.C.
For primary bibliographic entry see Field 6G.
W76-12037

THE SWALE,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12038

NAVIGABLE WATER, A DEFINITION: ALL BENT OUT OF SHAPE,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12039

AGRICULTURAL PRACTICES TO REDUCE NON-POINT POLLUTION IN THE OKEECHOBEE-KISSIMMEE BASIN,
Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.
For primary bibliographic entry see Field 6E.
W76-12041

EBB AND FLOW: NAVIGABILITY AND THE CORPS OF ENGINEERS WASHED IN THE TIDE OF ENVIRONMENTAL PROTECTION,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12043

FEDERAL JURISDICTION OVER LANDFILLS ON SUB-AQUEOUS LANDS,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12046

EFFLUENT CHARGES, TOWARDS A NEW ENVIRONMENT,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12048

A SURVEY OF THE VARIOUS STATE POWER PLANT SITING LAWS,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12050

FEDERAL REGULATION IN THE LICENSING OF NUCLEAR POWER PLANT FACILITIES,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12051

RESIDENTIAL DEVELOPMENT A LOOK AT THE REGULATORY CONTROLS OF FLORIDA'S WATER RESOURCES,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12057

DEPARTMENT OF HEALTH SERVICES (FUNCTIONS IN WATER POLLUTION CONTROL).
For primary bibliographic entry see Field 6E.
W76-12064

BOYER V DEPARTMENT OF HEALTH (THE LATITUDE OF COUNTY REGULATIONS IN REGARD TO WATER PURITY).
For primary bibliographic entry see Field 6E.
W76-12076

COMMONWEALTH DEPT OF ENVIRONMENTAL RESOURCES V BIERMAN (WATER PERMITS AND FLUORIDATION OF WATER).
For primary bibliographic entry see Field 6E.
W76-12078

VILLAGE SAFE WATER ACT.
For primary bibliographic entry see Field 6E.
W76-12082

MUNICIPAL SEWERAGE SYSTEMS (POWERS).
For primary bibliographic entry see Field 6E.
W76-12090

LOWER CONNECTICUT RIVER CONSERVATION ZONE.
For primary bibliographic entry see Field 6E.
W76-12091

DETERGENTS (RESTRICTIONS ON SALE OR USE).
For primary bibliographic entry see Field 6E.
W76-12092

PUBLIC WATER SUPPLY SYSTEMS AND WASTEWATER TREATMENT PLANTS.
For primary bibliographic entry see Field 6E.
W76-12094

ELK RIVER DEVELOPMENT AGENCY.
For primary bibliographic entry see Field 6E.
W76-12095

WATER POLLUTION--BOAT TOILET LAW.
For primary bibliographic entry see Field 6E.
W76-12103

OIL SPILL PREVENTION AND POLLUTION CONTROL ACT.
For primary bibliographic entry see Field 6E.
W76-12105

ENVIRONMENTAL CONSERVATION (WATER POLLUTION CONTROL).
For primary bibliographic entry see Field 6E.
W76-12107

UNITED STATES V KENNEBEC LOG DRIVING COMPANY (RIVER AND HARBORS ACT APPLICABLE TO LOG DRIVING ACTIVITY).
For primary bibliographic entry see Field 6E.
W76-12108

GRAIN PROCESSING CORP V TRAIN (SINGLE NUMBER EFFLUENT STANDARD AS ARBITRARY--MUST HAVE A RANGE OF NUMBERS).
For primary bibliographic entry see Field 6E.
W76-12109

CENTRAL ILLINOIS PUBLIC SERVICE CO. V. EPA (THE TAKING ISSUE AND EFFLUENT STANDARDS).
For primary bibliographic entry see Field 6E.
W76-12112

STRICT LIABILITY FOR THE DISCHARGE OF HAZARDOUS SUBSTANCES.
For primary bibliographic entry see Field 6E.
W76-12118

POWERS AND FUNCTIONS OF CITIES AND TOWNS (WATER RELATED).
For primary bibliographic entry see Field 6E.
W76-12130

WATER AND WASTEWATER TREATMENT PLANT OPERATORS.
For primary bibliographic entry see Field 6E.
W76-12131

RECREATION LAND PRESERVATION ACT OF 1971.
For primary bibliographic entry see Field 6E.
W76-12132

POLLUTION CONTROL IN MEAT, POULTRY AND SEAFOOD PROCESSING,
For primary bibliographic entry see Field 5D.
W76-12146

REGIONAL WATER QUALITY MANAGEMENT,
SEATAC Inc., Bangkok (Thailand).

H. F. Ludwig, and P. N. Storrs.
J Water Pollut Control Fed. 45(10); p 2065-2071, 2237, 1973.

Descriptors: Water quality, *Regional analysis, *Management, Programs, Projects, *Water quality control, Water pollution control, Planning.

The necessity for regional water quality management as opposed to purely local management is analyzed. Specific definition and specific objectives of such a program are outlined as well as methods for measurements of performance, problems in jurisdiction and responsibility, and the technological, financial and human resources necessary for a successful program.--Copyright 1974, Biological Abstracts, Inc.
W76-12147

SURVEILLANCE IN WATER QUALITY MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
R. C. Ward, S. R. Nichols, and G. V. Skogerboe.
J Water Pollut Control Fed. 45(10); p 2081-2087, 2237, 1973.

Descriptors: *Water quality control, *Management, *Monitoring, Data collections, Evaluation, Water pollution control.

Surveillance in water quality management becomes an end in itself rather than a means to an end. Little attempt has been made to check the accuracy of the data, utilize the information it yields, or evaluate changing data collection needs. The strategy developments that have occurred in most states, the importance of the data in the successful implementation of these strategies the failures in utilization of the data, and the proposed remedies for correcting the situation are discussed.--Copyright 1974, Biological Abstracts, Inc.
W76-12148

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

TRADE-OFF BETWEEN MODELS AND INFORMATION IN RIVER BASIN PLANNING,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources; and Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.
For primary bibliographic entry see Field 4A.
W76-11702

FLOOD CONTROL DESIGN WITH LIMITED DATA - A COMPARISON OF THE CLASSICAL AND BAYESIAN APPROACHES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-11703

RESERVOIR EFFECTS ON PROPERTY VALUES ACCORDING TO LOCATION AND RURAL VS. URBAN USE,
Kentucky State Univ., Frankfort. School of Public Affairs.
For primary bibliographic entry see Field 4A.
W76-11708

RELATING ENVIRONMENTAL MODELING TO POLICY ISSUES AND DECISIONS,
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11879

MATHEMATICAL MODELLING AND ENVIRONMENTAL DECISION-MAKING,
Department of Environment, Ottawa, Ont. Canada, Environmental Systems Branch.
For primary bibliographic entry see Field 6G.
W76-11880

MODELS IN WATER QUALITY PLANNING,
Karlsruhe Univ. (West Germany). Institut fuer Siedlungswasserwirtschaft.
For primary bibliographic entry see Field 5B.
W76-11882

SYSTEMS APPROACH FOR THE PLANNING AND MANAGEMENT OF THE MORAVA RIVER BASIN, YUGOSLAVIA,
California Univ., Los Angeles. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-11886

RELATIONS BETWEEN PROJECT ECONOMICS AND HYDROLOGICAL DATA,
Economic Commission for Europe(UN), New York.
For primary bibliographic entry see Field 6B.
W76-11970

OPTIMIZATION OF WATER RESOURCES DEVELOPMENT PROJECTS IN CASE OF INADEQUATE HYDROLOGIC DATA,
Research Inst. for Water Resources Development, Budapest (Hungary).
A. Filotti, G. Frank, and C. Parvulescu.
In: Design of Water Resources Projects with Inadequate Data, Vol. 2, Proceedings of the Madrid Symposium, June 1973; Unesco-WMO-IAHS, Unesco-OOM-AISH, 1974, p 661-681. 4 fig, 10 ref.

Descriptors: *Water resources development, *Projects, *Optimization, *Hydrologic data, *Methodology, Systems analysis, Flow, River regulation, Water demand, Design, Operations, Flood control, Multiple purpose.
Identifiers: Dimensioning, Hydroelectric works.

The problems facing hydraulic engineers are of great diversity and decisions in their fields of activity often imply a considerable responsibility in respect to the economic consequences and the social and ecologic effects of such decisions. The operation of water resources development structures depends on the degree of knowledge available on natural data, especially on those related to hydrologic events. A great diversity of situations exists concerning available hydrologic data, covering the whole field from total lack to an acceptable volume of information. It is therefore appropriate to talk about groups or types of methodologies having a common principle, which have then to be adapted to concrete conditions and objectives of each investigated project. The methods which can be applied in case of inadequate hydrological data may be classified as follows: methods based on the generation of synthetic hydrologic sequences, such as Monte Carlo methods; methods based on the generation of hydrologic sequences by correlation with rainfall; methods based on the generalization of results of water resources engineering computations; and methods based on the theory of games. This article presents ways in which these methods can be applied in some key problems of water resources engineering: (1) the dimensioning of river flow regulating works designed for meeting water demands; (2) dimensioning of hydroelectric works; (3) design and operation of flood control developments; and (4) multi-purpose water resources development. (Bell-Cornell)
W76-11971

6B. Evaluation Process

EDUCATIONAL AND INFORMATIONAL NEEDS FOR ACHIEVING PUBLIC ACCEPTANCE,
Purdue Univ., Lafayette, Ind. Cooperation Extension Service.
For primary bibliographic entry see Field 5G.
W76-11640

ENVIRONMENTAL ASSESSMENT: A PLANNING TOOL,
Ontario Ministry of the Environment, Toronto. Environmental Approvals Branch.
For primary bibliographic entry see Field 6G.
W76-11649

PROJECT CURE,
Environmental Protection Agency, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W76-11661

LOWER WALLER CREEK MASTER IMPROVEMENT PLAN,
Taniguchi, Shefelman, Vackar, and Minter, Austin, Tex.
For primary bibliographic entry see Field 5D.
W76-11662

WATER RECLAMATION: TECHNOLOGY AND PUBLIC ACCEPTANCE,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 5D.
W76-11705

REGIONAL PLANNING FOR LAND DISPOSAL OF WASTEWATER,
Missouri Univ., St. Louis.
For primary bibliographic entry see Field 5D.
W76-11706

A METHODOLOGY FOR EVALUATING DEVELOPMENT-ENVIRONMENTAL CONFLICTS ON WILD AND SCENIC RIVERS,
Idaho Univ., Moscow. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6G.
W76-11707

THE CHALLENGE OF WATER RESOURCES EDUCATION,
For primary bibliographic entry see Field 9A.
W76-11863

THE FUTURE OF THE SAVANNAH RIVER, PROCEEDINGS OF A SYMPOSIUM.
Clemson Univ., S.C. Water Resources Research Inst.
For primary bibliographic entry see Field 4A.
W76-11877

SYSTEMS APPROACH FOR THE PLANNING AND MANAGEMENT OF THE MORAVA RIVER BASIN, YUGOSLAVIA,
California Univ., Los Angeles. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-11886

PUBLIC PARTICIPATION IN WATER RESOURCES DEVELOPMENT, A BIBLIOGRAPHY.
Office of Water Research and Technology, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-257 173,

$5.00 in paper copy, $3.00 in microfiche. Water Resources Scientific Information Center, Report OWRT/WRSIC 76-205, August 1976, 166 p.

Descriptors: *Social participation, *Bibliographies, *Decision making, *Planning, *Water resources development, Abstracts, Documentation, Social values.
Identifiers: *Public participation, Citizen participation.

This report, containing 107 abstracts, is another in a series of planned bibliographies in water resources produced from the Water Resources Scientific Information Center (WRSIC) information base comprising SELECTED WATER RESOURCES ABSTRACTS (SWRA). At the time of search for this bibliography, the data base had 95,781 abstracts covering SWRA through April 15, 1976 (Volume 9, Number 8). Author and subject indexes are included.
W76-11903

THE ENVIRONMENT AND THE OFFSHORE OIL INDUSTRY IN SCOTTISH WATERS - A REVIEW. PART 2. THE REGIONAL PATTERN OF DECISION MAKING,
Newcastle upon Tyne Polytechnic (England). Dept. of Humanities.
For primary bibliographic entry see Field 5B.
W76-11946

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOLUME 2, (APPENODICES).
Council on Environmental Quality, Washington, D. C.
For primary bibliographic entry see Field 6G.
W76-11948

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 5, SIMULATION OF HYPOTHETICAL OFFSHORE PETROLEUM DEVELOPMENTS.
Massachusetts Inst. of Tech., Cambridge, Mass.
For primary bibliographic entry see Field 6G.
W76-11953

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOL 5, ANALYSIS OF OIL SPILL STATISTICS.
Massachusetts Inst. of Tech., Cambridge, Mass.
For primary bibliographic entry see Field 6G.
W76-11954

RELATIONS BETWEEN PROJECT ECONOMICS AND HYDROLOGICAL DATA,
Economic Commission for Europe(UN), New York.
A. Pobedimsky.
In: Design of Water Resources Projects With Inadequate Data, Vol. 2, Proceedings of the Madrid Symposium, June 1973; Unesco-WMO-IAHS, 1974, p 683-696.

Descriptors: *Water resources, *Management, *Hydrologic data, *Economic impact, *Planning, Effects, Design, Hydraulic engineering, Structures, Operations, Flood protection, Rivers, Flow, Watersheds(Basins), Water utilization, Water supply, Projects.
Identifiers: *Inadequate data.

Economic Commission for Europe (ECE) countries are experiencing a depletion of natural resources due to the accelerating population growth rate and the economic progress in technological changes. These nations are obliged to improve their water resources management, particularly the accuracy and availability of hydrologic data. This paper appraises the possible economic effect of insufficient hydrological data on the effectiveness of water planning and the design of hydraulic engineering structures and their operation. Considered specifically are: the economic consequences of a deficiency of hydrological data on water planning, construction and operation; and the impact of a deficiency of hydrological data on main water users. These aspects are discussed in terms of following problems: water planning and design; planning and designing of flood protection; the importance of accurate data to show flow formation regarding human activity at watersheds of rivers; domestic and industrial water supply; generation of electric energy by hydro-electric plants and thermal power plants; irrigation; river navigation; fisheries; hydrological forecast for water pollution control programs; sediment control; and data on ice and slush conditions. Insufficient hydrological data and forecasting has considerable impact in all phases of water resources planning and development. (Bell-Cornell)
W76-11970

WATER RESOURCES PLANNING ACT--OVERSIGHT.
For primary bibliographic entry see Field 6E.
W76-11998

COASTAL ZONE MANAGEMENT IN FLORIDA: THE NEED FOR A COMPREHENSIVE PROGRAM,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12055

REGIONAL WATER QUALITY MANAGEMENT,
SEATAC Inc., Bangkok (Thailand).
For primary bibliographic entry see Field 5G.
W76-12147

SURVEILLANCE IN WATER QUALITY MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W76-12148

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

WATER POLLUTION CONTROL: CROSSROADS OF A MUNICIPAL FINANCIAL DILEMMA,
North Texas State Univ., Denton. Dept. of Administrative Sciences and Marketing.
For primary bibliographic entry see Field 5D.
W76-11626

THE ECONOMIC IMPACT OF CONTROLLING NONPOINT POLLUTION IN HARDWOOD FORESTLAND,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5G.
W76-11697

WATER POLLUTION CONTROL ACT OF 1972, REGIONAL IMPACTS, YELLOWSTONE RIVER BASIN.
Stevens, Thompson and Runyan, Inc. Seattle, Wash.
For primary bibliographic entry see Field 5G.
W76-11789

WATER POLLUTION CONTROL ACT OF 1972, ECONOMIC IMPACTS, DAIRY PRODUCTS.
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5G.
W76-11801

WATER POLLUTION CONTROL ACT OF 1972, ECONOMIC IMPACTS, FOREIGN TRADE,
Public Research Inst., Arlington, Va.
For primary bibliographic entry see Field 5G.
W76-11802

WATER POLLUTION CONTROL ACT OF 1972, ECONOMIC IMPACTS, FRUITS AND VEGETABLES.
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5G.
W76-11803

WATER POLLUTION CONTROL ACT OF 1972, TECHNOLOGIES AND ECONOMIC IMPACTS, THE FEEDLOT INDUSTRY,
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5G.
W76-11804

THE ILLUSORY TREASURE OF DAVY JONES' LOCKER,
Southern Connecticut State Coll., New Haven. Dept. of Geography.
For primary bibliographic entry see Field 6E.
W76-11972

DEEPSEA VENTURES: EXCLUSIVE MINING RIGHTS TO THE DEEP SEABED AS A FREEDOM OF THE SEA,
For primary bibliographic entry see Field 6E.
W76-11973

EFFLUENT CHARGES, TOWARDS A NEW ENVIRONMENT,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12048

6D. Water Demand

ESTIMATING STOCK WATER USE IN RURAL WATER SYSTEMS,
Burns and McDonnell, Kansas City, Mo.
For primary bibliographic entry see Field 3F.
W76-11696

INTERSTATE WATER COMPACTS AND MINERAL DEVELOPMENT,
Loble, Picotte and Pauly, Helena, Mont.
For primary bibliographic entry see Field 3E.
W76-11977

WATERS: NUMBERLESS YET MEAGER,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-12040

6E. Water Law and Institutions

EPA GUIDANCE AND POLICY ON LAND TREATMENT,
Environmental Protection Agency, Washington, D. C. Office of Water Programs.
For primary bibliographic entry see Field 5D.
W76-11638

THE GREAT LAKES AGREEMENT - A MID-TERM PERSPECTIVE,
Department of the Environment, Ottawa (Ontario). Liaison and Coordination Directorate.
For primary bibliographic entry see Field 5G.
W76-11650

THE U. S. ENVIRONMENTAL PROTECTION AGENCY: PAST AND FUTURE CHALLENGES,
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5D.
W76-11658

WATER POLLUTION CONTROL ACT OF 1972, ECONOMIC IMPACTS, MEAT PRODUCTS,
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5G.
W76-11779

PUBLIC LAW 92-500: TECHNOLOGY ASSESSMENT, TECHNICAL VOLUME.
National Commission on Water Quality, Washington, D.C. Technology Assessment Sector.
For primary bibliographic entry see Field 5G.
W76-11780

ENVIRONMENTAL IMPACT ASSESSMENT, WATER QUALITY ANALYSIS, YADKIN - PEE DEE RIVER BASIN,
TRW, Inc. Redondo Beach, California.
For primary bibliographic entry see Field 5G.
W76-11781

WATER POLLUTION CONTROL ACT OF 1972, ENVIRONMENTAL IMPACT ASSESSMENT, POTOMAC RIVER.
Academy of Natural Sciences, Philadelphia, Pa.
For primary bibliographic entry see Field 5G.
W76-11782

WATER QUALITY ANALYSIS, SNAKE RIVER, IDAHO.
Tetra Tech, Inc., Lafayette, Calif.
For primary bibliographic entry see Field 5G.
W76-11783

WATER POLLUTION CONTROL ACT OF 1972, ENVIRONMENTAL IMPACT ASSESSMENT, SNAKE RIVER.
Parametrix, Inc., Seattle, Wash.
For primary bibliographic entry see Field 5G.
W76-11784

WATER QUALITY ANALYSIS, UPPER RIO GRANDE.
Water Resources Engineers, Inc., Austin, Tex.
For primary bibliographic entry see Field 5G.
W76-11785

WATER POLLUTION CONTROL ACT OF 1972, ENVIRONMENTAL IMPACT ASSESSMENT, IOWA-CEDAR RIVER BASIN.
Midwest Research Inst., Minneapolis, Minn. North Star Research Div.
For primary bibliographic entry see Field 5G.
W76-11786

ENVIRONMENTAL IMPACT ASSESSMENT, WATER QUALITY ANALYSIS, J. PERCY PRIEST RESERVOIR.
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 5G.
W76-11787

ENVIRONMENTAL IMPACT ASSESSMENT, WATER QUALITY ANALYSIS, UTAH LAKE - JORDAN RIVER BASIN.
Environmental Dynamics, Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 5G.
W76-11788

WATER POLLUTION CONTROL ACT OF 1972, REGIONAL IMPACTS, YELLOWSTONE RIVER BASIN.
Stevens, Thompson and Runyan, Inc. Seattle, Wash.
For primary bibliographic entry see Field 5G.
W76-11789

ENVIRONMENTAL IMPACT ASSESSMENT, WATER QUALITY ANALYSIS, LOWER MISSOURI RIVER BASIN.
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5G.
W76-11790

WATER POLLUTION CONTROL ACT OF 1972, ENVIRONMENTAL IMPACT ASSESSMENT, UPPER MISSISSIPPI RIVER BASIN,
Midwest Research Inst., Minneapolis, Minn. North Star Research Div.
For primary bibliographic entry see Field 5G.
W76-11791

PUBLIC LAW 92-500-- WATER QUALITY ANALYSIS AND ENVIRONMENTAL IMPACT ASSESSMENT, TECHNICAL REPORT (VOLUME I),
National Commission on Water Quality, Washington, D. C. Environmental Sciences Sector.
For primary bibliographic entry see Field 5G.
W76-11806

PUBLIC LAW 92-500--WATER QUALITY ANALYSIS AND ENVIRONMENTAL IMPACT ASSESSMENT, TECHNICAL REPORT, VOLUME II,
National Commission on Water Quality, Washington, D. C. Environmental Sciences Sector.
For primary bibliographic entry see Field 5G.
W76-11807

INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES.
For primary bibliographic entry see Field 2H.
W76-11847

INTERNATIONAL MANAGEMENT OF THE GREAT LAKES-ST. LAWRENCE BASIN,
Western Ontario University, London, Canada, Department of Geography. University of Western Ontario, London. Dept. of Geography.
For primary bibliographic entry see Field 2H.
W76-11887

WISCONSIN STRIVES TO MINIMIZE CONFLICTS OVER THE USE OF WATER,
For primary bibliographic entry see Field 4B.
W76-11896

BOUNDARIES OF SEABED JURISDICTION OFF THE PACIFIC COAST OF ASIA,
N. Ely, and R. F. Pietrowski, Jr.
Natural Resources Lawyer, Vol 8, p 611-629 (1976). 19 p, 43 ref.

Descriptors: *Ownership of beds, *Water resources development, *Foreign countries, *Continental shelf, *Boundary disputes, Oceans, United Nations, Foreign waters, Treaties, Law of the sea, International waters, Mining, Legal aspects, International law, International commissions.
Identifiers: *Geneva Conventions of 1958, *International Court of Justice, *Coastal zone management.

Asian coastal states should have exclusive jurisdiction to license the seabed resources of marginal seas that they enclose, without regard to depth or distance. This right is supported by the International Court of Justice's North Sea decision, which said that undersea areas can be and often are submarine prolongations of land territories. Principles which should determine boundaries between these states are listed and explained. Specific geographical features, such as the Yellow Sea, the East China Sea, the South China Sea and the Gulf of Thailand are the subjects of seabed boundary evaluations. (Frank-Florida)
W76-11897

REQUIRING POLLUTERS TO PAY FOR AQUATIC NATURAL RESOURCES DESTROYED BY OIL POLLUTION,
Office of the Judge Advocate General (Navy), Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11898

APPROPRIATION BY THE STATE OF MINIMUM FLOWS IN NEW MEXICO STREAMS,
For primary bibliographic entry see Field 4A.
W76-11899

MINIMUM STREAMFLOW-FEDERAL POWER TO SECURE,
For primary bibliographic entry see Field 4A.
W76-11900

PROPERTY RIGHTS IN THE WORLD OCEAN,
Resources for the Future, Inc., Washington, D.C.
F. T. Christy, Jr.
Natural Resources Journal, Vol 15, p 695-712 (October 1975). 18 p, 15 ref.

Descriptors: *Mining, *Continental shelf, *Ownership of beds, *United Nations, *Law of the sea, *Water resources development, Economics, Economic feasibility, Economic efficiency, Manganese, Mineral industry, International law, International waters, Oceans, Legislation, Federal jurisdiction, Jurisdiction.
Identifiers: *Coastal waters.

In the past, the cost to coastal nations of keeping an ocean area exclusive was greater than the potential benefits to be derived. This assessment is in doubt today as nations are on the verge of ocean resource mining. Costs and benefits are unknown. Thus, property rights are also in flux as nations are attempting to base their legal rights on economic factors. Alternative schemes include an enterprise system, a licensing system, and unilateral protection of national entrepreneurs. Consequences of these plans are discussed, as well as the likelihood of implementation. Considerable economic waste exists today from the common property condition, but it is unknown whether political pressures for unilateral sovereignty are justified. The United Nations Conference on the Law of the Sea, as well as further research, will hopefully provide some of the answers, both political and economic. (Frank-Florida)
W76-11901

INDIAN TREATY ANALYSIS AND OFF-RESERVATION FISHING RIGHTS: A CASE STUDY,
R. A. Finnigan.
Washington Law Review, Vol 51, p 61-95 (1975). 35 p, 177 ref.

Descriptors: *Treaties, *Indian reservations, *Fishing, *Judicial decisions, *Legal aspects, Fish, Fish farming, Legal review, State govern-

ments, State jurisdiction, Rivers, Streams, Water law, Federal reservations.

A recent federal district court decision, U. S. v. Washington, held that certain treaties in the northwest gave Indians the opportunity to harvest 50% of the salmon and steelhead run. The decision is examined here in light of the history of fishing rights in the area, as well as the evolution of state regulation of off-reservation indian treaty fishing. The treaty was held to be not a grant of rights to the Indians, but a grant of fishing rights from them, with all rights not granted reserved to the Indians. Taking of fish on off-reservation land granted by treaty, although previously regulated by the state, must be excluded from such regulation. However, treaty limits grant the Indians only an equal share of fishing rights in conjunction with non-Indians in the areas designated. (Frank-Florida)
W76-11902

HARRIS-GALVESTON SUBSIDENCE DISTRICT CREATED TO 'END' SUBSIDENCE,
Harris-Galveston Coastal Subsidence District, Houston, Tex.
For primary bibliographic entry see Field 4B.
W76-11919

METHOD OF CONTROL OF LAND AND WATER USES IN THE COASTAL ZONE,
George Washington Univ., Washington, D. C.
A. H. Berger.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-249 799, $4.50 in paper copy, $3.00 in microfiche. George Washington University Master's thesis; prepared for NOAA Office of Coastal Zone Management, October 1975. 44 p, 6 tab, 24 ref.

Descriptors: *Resources development, *Management, *Coasts, Water resources, *Land use, Governments, Federal government, Local governments, State governments, Planning, Water utilization.
Identifiers: *Coastal Zone management.

The 'methods of control of land and water uses in the coastal zone' of the Coastal Zone Management Act of 1972 are examined. Three methods determine the manner in which the state's coastal zone management program will be implemented. They are: Local regulation according to state guidelines; direct state regulation; and state administrative review of plans for consistency with state management program. This paper describes the derivation of the three models from past experience in resource management at the Federal and state level, and identifies and analyzes the potential advantages for each method. Next, it documents a trend which indicates that more states are considering using the first method alone or in combination with either the second or third methods. Finally, it concludes that the most efficious program would consist of a mix between the first and second methods. In the resulting 'suggested method' the state would directly regulate regional uses, while there would be local government planning and regulation for all other uses. (Sinha-OEIS)
W76-11922

OCS OIL AND GAS - AN ENVIRONMENTAL ASSESSMENT. A REPORT TO THE PRESIDENT BY THE COUNCIL ON ENVIRONMENTAL QUALITY, VOLUME 2, (APPENODICES).
Council on Environmental Quality, Washington, D. C.
For primary bibliographic entry see Field 6G.
W76-11948

THE ILLUSORY TREASURE OF DAVY JONES' LOCKER,
Southern Connecticut State Coll., New Haven. Dept. of Geography.
M. I. Glassner.
San Diego Law Review, Vol 13, p 533-551 (1976). 19 p, 49 ref.

Descriptors: *Continental shelf, *Mining, *Manganese, *Economics, *United Nations, Continental slope, Continental margin, Cost-benefit analysis, Feasibility, International law, International waters, United States, Mining engineering, Exploration, Water resources development, Foreign countries.
Identifiers: Coastal zone management, Coastal waters.

With seabed mineral mining about to undergo substantial expansion, nationalism has intruded by presenting an increase in the number of extended coastal economic zones. Related problems include responsibility for water pollution and for new methods of technology. Coastal nations are extending their zones to the limits of the continental shelf, with the result that land-locked nations seem to be losing any chance for sharing in seabed resources. The author proposes that such interests be protected under the proposed United Nations Charter of Economic Rights and Duties of States. Under a new seabed authority, coastal nations would donate an agreed percentage of mineral values, including hydrocarbon proceeds. Assistance in technology and development could also be granted. This trend is slow in coming, however, and the current energy squeeze makes cooperation more unlikely. Manganese nodule mining seems to be the most economical subject for such cooperation. (Frank-Florida)
W76-11972

DEEPSEA VENTURES: EXCLUSIVE MINING RIGHTS TO THE DEEP SEABED AS A FREEDOM OF THE SEA,
J. G. Jackson.
Baylor Law Review, Vol 28, p 170-186 (Winter 1976). 17 p, 67 ref.

Descriptors: *Mining, *Law of the sea, *International law, *United States, *Manganese, Economics, International waters, Exploration, Continental shelf, Development, Legal aspects, Conferences, United Nations, Feasibility, Coasts, Foreign countries.
Identifiers: Coastal waters.

Examined here is whether exclusive rights to seabed resources have legal precedent in the law governing the surface of the high seas. Deepsea Ventures Inc., a United States company, claimed exclusive rights to seabed manganese nodules in the northern Pacific Ocean. The basis of this claim was extensive, resting on international conventions, international custom and generalized principles of law. Concern arose over the United States' reluctance to claim outright the seabed for itself and, therefore, over who would ultimately be responsible for any damages that might result from the mining. The author urges that the company be denied its exclusive rights due to the probable retaliation of other coastal states. The Law of the Sea should not be governed by gunboat diplomacy. (Frank-Florida)
W76-11973

WATER ALLOCATION IN UTAH--PROTECTION OF INSTREAM USES,
For primary bibliographic entry see Field 4A.
W76-11974

COMPENSATION FOR OIL POLLUTION AT SEA: AN INSURANCE APPROACH,
San Diego Univ., Calif. School of Law.
For primary bibliographic entry see Field 5G.
W76-11975

WETLAND'S RELUCTANT CHAMPION: THE CORPS TAKES A FRESH LOOK AT 'NAVIGABLE WATERS',
Lewis and Clark Coll., Portland, Oreg. Northwestern School of Law.
For primary bibliographic entry see Field 4A.
W76-11976

INTERSTATE WATER COMPACTS AND MINERAL DEVELOPMENT,
Loble, Picotte and Pauly, Helena, Mont.
For primary bibliographic entry see Field 3E.
W76-11977

ADJUDICATION OF INDIAN AND FEDERAL WATER RIGHTS IN THE FEDERAL COURTS: UNITED STATES V AKIN.
University of Colorado Law Review, Vol 46, No 4, p 555-85 (1975). 31 p.

Descriptors: *Indian reservations, *Federal reservations, *Federal-state water rights conflicts, *Federal jurisdication, Reservation doctrine, State jurisdiction, Water rights, Colorado, Judicial decisions, National parks, National historic sites, National recreation areas.
Identifiers: *McCarran Amendment.

A recent federal appellate decision allows federal court jurisdiction over water rights adjudications when the United States asserts proprietary interests as plaintiff. Examined here is the relationship of the McCarran Amendment to federal jurisdiction. The amendment removes federal sovereign immunity in water adjudications. The author concludes that the federal courts should not rely on the abstention doctrine when state questions cannot dispose of constitutional issues. Furthermore, limited federal jurisdiction is preferred to prevent undue interference with state institutions and for protection of legitimate state interests. When the United States files as plaintiff for determination of federal rights the choice of federal forum should be seriously considered but priority of suit may not always be an appropriate determination when an ongoing state procedure is present. With regard to determination of Indian water rights the author determines that state courts are without jurisdiction. (Comer-Florida)
W76-11978

ENVIRONMENTAL LAW--STATUTORY INTERPRETATION--THE ENVIRONMENTAL PROTECTION AGENCY ENTERS THE NUCLEAR AGE--COLORADO PUBLIC INTEREST RESEARCH GROUP, INC V TRAINS 507 F2D 743 (10TH CIR 1974),
For primary bibliographic entry see Field 5G.
W76-11979

PROBLEMS OF GROUNDWATER RIGHTS IN OHIO,
Akron Univ., Ohio. School of Law.
For primary bibliographic entry see Field 4B.
W76-11980

NITRATE POLLUTION AND THE CALIFORNIA ENVIRONMENTAL QUALITY ACT: THE APPROPRIATE SOLUTION TO A NEGLECTED PROBLEM,
For primary bibliographic entry see Field 5G.
W76-11981

PROTECTION OF THE MARINE ENVIRONMENT,
National Petroleum Council, Washington, D. C. Committee on Ocean Petroleum Resources.
For primary bibliographic entry see Field 5G.
W76-11982

THE SETTLEMENT OF INTERNATIONAL ENVIRONMENTAL DISPUTES,
Wisconsin Univ., Madison. School of Law.
R. B. Bilder.
University of Wisconsin Sea Grant College Program, Technical Report 231, University of Wisconsin (February 1976). 92 p.

Descriptors: *Foreign countries, *International law, *Law of the sea, *Jurisdiction, *Environmental control, Economics, Air pollution, Water pollution, Water policy, Political aspects, Legal aspects, Environmental engineering, Environmental sanitation, Economic impact, Exploitation, Governments, International commission, Water resources development.

International environmental concern is a phenomenon of the past decade. It is a rapidly growing, complex, and poorly defined field with a great amount of potential, as well as controversy, in specific areas. This monograph presents five lectures dealing with disputes arising and methods of settlement in the international environmental sphere. The lectures focus on disputes concerning international rivers and lakes, marine environment, air pollution, and on new frontiers such as outerspace and nuclear testing. Each lecture presents an overview of relevant law relating to the area discussed and then analyses actual disputes and their solution. Some actual problems treated are the Colorado River salinity dispute, the Lake Lanoux dispute, the Finnish arsenic dumping incident, the recent Law of the Sea Conference, the Ozone problem, Scandanavia's 'acid rain', and the St. Clair River problem. The concluding lecture presents some principles of international law related to the environmental problem. Recognition of international responsibility, flexibility in problem solving, development of knowledge and avoidance of disputes are some of the principles explored. (Comer-Florida)
W76-11983

U. S. DEFINES POSITION ON 200-MILE ECONOMIC ZONE AT CONFERENCE ON THE LAW OF THE SEA,
Rhode Island Univ., Kingston. Law of the Sea Inst.
J. R. Stevenson.
Department of State Bulletin, Vol. 71, p. 232-236, August 5, 1974. 5 p.

Descriptors: *United Nations, *Law of the sea, *Boundary disputes, *Jurisdiction, *Treaties, Navigation, Straits, Navigable waters, Ownership of beds, Bodies of water, Oceans, Legal aspects, Political aspects, International law, Foreign waters, International waters, Foreign trade, Commercial fishing, Administration, Regulation, Pollution, Research, United States.
Identifiers: *Territorial sea, *Economic zone.

The U. S. Special Representative to the Third U. N. Conference on the Law of the Sea at Caracas addressed the Conference on July 11 and present his views on the objectives and accomplishments of the Conference. He noted the growing consensus for extending the twelve mile outer limit for territorial sea jurisdiction and for establishing two hundred mile outer limit for coastal state economic zones. He also addressed the issues of free transit through international straits and of non-discriminatory access to the resources of the seabed under the overviw of an international authority. Finally, he stated that the minimum objectives of the Caracas Session should be to complete treaty texts on: (1) the limits of the territorial seas and economic zones; (2) the formation of an international authority; (3) control of the seabed; and (4) measures for pollution control and scientific research. (Hadoulias-Florida)
W76-11984

OIL, SUPER-SHIPS AND THE OCEANS,
For primary bibliographic entry see Field 5G.
W76-11985

THE INTRACOASTAL WATERWAY: AN ECOLOGICAL PERSPECTIVE,
Florida Atlantic Univ., Boca Raton. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5G.
W76-11986

SPECIAL DISTRICTS--CREATION OF WATER MANAGEMENT DISTRICT PURSUANT TO GENERAL LAW IN A CHARTER COUNTY.
Florida Office of the Attorney General, Tallahassee. Dept. of Legal Affairs.
Op Att'y Gen Fla 075-108 (1975). 4 p.

Descriptors: *Local governments, *Florida, *Governmental interrelations, *Water districts, *Adoption of practices, State governments, Legislation, Legal aspects, Political aspects, Institutional constraints, Institutions, Planning, Regulation, Water law, Water policy, Administration, Management, Comprehensive planning, Control.

The Florida Attorney General was asked whether a special water management district could be established in Broward County, Florida, pursuant to Chapter 298 of the Florida Statutes in view of the recently enacted Broward County charter and of Chapter 165 of the statutues. He answered in the negative after tracing the legislative history of the chapters in question and analyzing a Florida District Court of Appeal case. Such districts may be established only in accordance with the provisions of Chapter 74-192, Laws of Florida. The Attorney General also analyzed the levying of ad valorem taxes by water management districts. (Reinders-Florida)
W76-11988

COMPREHENSIVE OIL POLLUTION LIABILITY AND COMPENSATION ACT OF 1975.
For primary bibliographic entry see Field 5G.
W76-11990

REVIEW OF PROJECTS AFFECTING SOLE SOURCE AQUIFERS, EDWARDS UNDERGROUND RESERVOIR, TEXAS AREA; INTERIM PROJECT REVIEW GUIDELINES.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11991

INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY.
Environmental Protection Agency,Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11992

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM: SEPARATE STORM SEWERS.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11993

OFFSHORE SEGMENT OF THE OIL AND GAS EXTRACTION POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-11994

ALASKA NATIONAL INTEREST LANDS.
Hearings---Comm on Interior and Insular Affairs, US Senate, Nov 21, Dec 11, 1975, p 1-272.

Descriptors: *Alaska, *Legislation, *Federal government, *National parks, *Wild rivers, National recreation areas, Federal jurisdiction, Rivers, Streams, Lakes, Legal aspects, Ecology, Environment, Water resources, Water sources, Water resources development.
Identifiers: *Congressional hearings.

Hearings were held on three bills, S. 1687, S. 1688 and S. 2676, which would implement the Alaska Native Claims Settlement Act. Approximately 270 million acres are potentially designated for inclusion in five national conservation systems: the National Forest, Park Wild and Scenic Rivers, and Wildlife Refuge Systems, as well as a new Scenic Reserve System. Statements were entered in the record in support of the bills, and contained explanations of the practical effects of the legislation. Rivers, streams and lakes to be included are specifically delineated, as well as fishing areas. (Frank-Florida)
W76-11995

MARINE MAMMAL PROTECTION OVERSIGHT.
Hearings---Sub Comm on Fisheries and Wildlife Conservation and the Environment---Comm on Merchant Marine and Fisheries, US House of Representatives, Oct 21, 29, 30, Dec 9, 1975, p 1-325.

Descriptors: *Conservation, *Marine fish, *Mammals, *Marine animals, *Fish conservation, Fishing, Fish farming, Fish populations, Protection, Aquatic life, Commercial fish, Permits, Legal aspects, Treaties, Oceans.

Oversight hearings have been held concerning the implementation of the Marine Mammal Protection Act. The relationship between purpoise conservation and tuna fishing practices was discussed on both the national and international levels. The participation of states in marine mammal management, as well as legal processes involved in their protection were also examined. The committee gave close scrutiny to the killing of seals and the fur trade, including both numbers killed and methods of killing. Members of the committee urged stronger penalties for indiscriminate or brutal seal killing. Finally, treaty obligations pertaining to tuna and seal-harvesting were discussed. (Frank-Florida)
W76-11996

LAND AND WATER RESOURCE CONSERVATION ACT OF 1976.
S Rep No 94-895, 94th Cong, 2d Sess 1-14 (1976). 14 p.

Descriptors: *Planning, *Federal government, *Legislation, *Long-term planning, *Water resources development, Comprehensive planning, Natural resources, Political aspects, Decision making, Resource development, Water law, Water quality, Water policy, Land resources, Protection, Economics, Governments, Conservation, Soil conservation, Water conservation, Regulation.
Identifiers: Congressional hearings.

The Committee on Agriculture and Forestry submitted this report on S.2081, a bill to provide for furthering the conservation, protection, and enhancement of the Nation's land, water, and related resources for sustained use, and for other purposes. The Committee reports favorably thereon with an amendment and recommends passage of the bill. S.2081 would establish a mechanism for making long-range policy to encourage the wise and orderly development of the Nation's soil and water resources. Included within the report are: a short explanation of the provisions of the bill and the relevant factors to be considered in determining long-range policy; a discussion on the background and need for the legislation; a section-by-section analysis of the bill; and an estimate of the costs that would be incurred by the Federal Government as a result of enactment for the years 1977-1982. There is also an appendix

delineating the responsibilities and programs of the Soil Conservation Service, an agency of the Department of Agriculture. (Reinders-Florida)
W76-11997

WATER RESOURCES PLANNING ACT--OVERSIGHT.
Hearings---Sub Comm on Energy Research and Water Resources---Comm on Interior and Insular Affairs, US Senate, Oct 16, 1975, p 1-230.

Descriptors: *Columbia River, *Legislation, *Planning, *River basin commissions, *Water Resources Planning Act, Water resources, State governments, Federal government, Financing, Columbia River, Water Resources Research Act, Water resource development, Administration, Interstate commissions, Project purposes, Regional development.
Identifiers: *Congressional hearings.

Hearings have been held to find better ways to extend the Water Resources Planning Act (WRPA) in 1976. Presented at these hearings were the views of various states on issues such as the need for more federal funding and greater autonomy for river basin commissions. The states also requested greater representation on the Water Resources Council (WRC), and the establishment of a regionalized structure within it. Basically, the States wanted expansion of the WRC in order to create a more cohesive national water resource policy. Expansion of Title III of the WRPA was suggested as a means of achieving greater effectiveness. As to Title II, dealing with the River Basins Commission, the majority of states felt that the Federal Government should plan through it rather than through other agencies. This was especially true in regard to the Columbia River Basin. (Frank-Florida)
W76-11998

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION -- OVERSIGHT HEARINGS.
Hearings --- Sub Comm. on the Environment and the Atmosphere --- Comm. on Science and Tech., US House of Representatives, July 16-18, 22-25, 1975, p. 1-488.

Descriptors: *Fish conservation, *Water pollution control, *Environmental effects, *Weather modification, Water pollution sources, North America, Environments, Floods, Thunderstorms, Fishing, Oceans, Oceanography, Sea ice, Seed treatment, Sea water, Snow, Snowfall, Snowmelt.

The purpose of the hearings was to acquaint the committee members with the work of the National Oceanic and Atmospheric Administration (NOAA) over the past years. Witnesses testified as to NOAA's work in weather control, including cloud-seeding to produce rain, and thunderstorm observation and prediction. Weather projects include snow-melt observation stations and hurricane prediction flights. Witnesses were also heard as to NOAA's water pollution studies off the east and west coasts, including fish poisoning reports and proposals for pollution control. Also presented were reports covering a wide range of environmental issues, including oil pollution from ships, and effects of all types of pollution on fish and fish management. (Frank-Florida)
W76-11999

WATER MANAGEMENT DURING DROUGHT EVENTS,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 4A.
W76-12000

RECYCLE--REUSE, INFALL--OUTFALL, DECISIONS CONFRONT SCIENCE, PUBLIC,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 5D.
W76-12001

MANAGING SOUTH FLORIDA'S GROUNDWATER AQUIFER,
Central and Southern Florida Control District, West Palm Beach.
For primary bibliographic entry see Field 4B.
W76-12002

EXAMINATION OF WATER MANAGEMENT ALTERNATIVES IN CONSERVATION AREA 2A.
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 4A.
W76-12003

LAW OF THE SEA: A STATE MUST EXERCISE SUBSTANTIAL CONTINUOUS AND RECOGNIZED AUTHORITY TO ESTABLISH A BODY OF WATER AS A HISTORIC BAY,
S. M. Stebbins.
Georgia Journal of International and Comparative Law, Vol 6, p 309-322 (1976). 14 p, 116 ref.

Descriptors: *Jurisdiction, *Continental shelf, *Bays, *Law of the sea, *Submerged Lands Act, Legal aspects, Legal review, Judicial decisions, Oil wells, State governments, Federal government, State jurisdiction, Federal jurisdiction, Legislation, Continental margin, Mineral industry.
Identifiers: *Coastal zone management.

Recent developments in water law indicate problems in deciding whether a state or the federal government has title to offshore oil deposits. The Submerged Lands Act granted inland water rights to the states; but the precise definition of offshore boundaries has yet to be made by Congress. The Supreme Court in a 1975 decision, U.S. v. Alaska, ruled that a state claiming land as an historic bay must show the exercise of substantial, continuous and recognized authority over that water. Alaska did not meet this burden, and the federal government retained title to the offshore rights. Exactly how much land belongs to the states and how much to the federal government is still unsettled. (Frank-Florida)
W76-12004

SETTLEMENT OF DISPUTES UNDER THE LAW OF OCEAN USE, WITH PARTICULAR REFERENCE TO ENVIRONMENTAL PROTECTION,
American Society of International Law, Washington, D.C.
J. L. Hargrove.
Georgia Journal of International and Comparative Law, Vol 6, p 181-196 (1976). 16 p, 36 ref.

Descriptors: *Treaties, *Water resources development, *Law of the sea, *United Nations, *International commissions, Water law, Legal aspects, Water rights, Legislation, Water policy, Governments, Judicial decisions, Legal review, International waters.

Examined here are formal procedures that will come into effect for the resolution of ocean disputes following a new, comprehensive law of the sea treaty. Expert committees will handle special classes of disputes, such as those concerning fisheries, pollution and scientific research. Where there are no special procedures, conciliation rules will be applicable. Where other disputes arise, binding decisions could be given by an arbitration tribunal, the Law of the Sea Tribunal, or any combination of the three. Substantive rules of great precision are required. Finally, resolution of environmental disputes will be left largely to the separate nations; thus, regulation of environmental activities will be kept to a minimum. (Frank-Florida)
W76-12005

AN INTERNATIONAL REGIME FOR THE SEABED BEYOND NATIONAL JURISDICTION,
Carnegie Endowment for International Peace, New York. International Law Program.
T. M. Franck.
Georgia Journal of International and Comparative Law, Vol 6, p 151-179 (1976). 29 p, 158 ref.

Descriptors: *United Nations, *International agreement, *Law of the sea, *Mining, *Economics, Legal aspects, Water law, Oceans, International commissions, Federal government, Foreign waters, Treaties, Manganese, United States, Water resources development.
Identifiers: *Third United Nations Conference on Law of the Sea.

The Third United Nations Conference on the Law of the Sea is presently working on establishing offshore limits for national economic zones. Several sets of limits are discussed, with benefits accruing to each. In all, however, the U.S., U.S.S.R., Canada, Australia and Indonesia will benefit the most. The system pushed presently by poor countries will result in a still greater discrepancy between rich and poor countries. Originally, more equitable proposals were advanced, but short-sighted poor nations demanded enlarged economic zones. Finally, the problems of any potential International Seabed Authority are listed. (Frank-Florida)
W76-12006

SOME BIOLOGICAL BACKGROUND FOR INTERNATIONAL LEGAL ACTS ON RATIONAL UTILIZATION OF THE LIVING RESOURCES OF THE WORLD OCEAN,
All-Union Research Inst. of Marine Fisheries and Oceanography; Moscow (USSR)
P. A. Moiseev.
Georgia Journal of International and Comparative Law, Vol 6, p 143-149 (1976). 7 p.

Descriptors: *Continental shelf, *Fishing, *United Nations, *International law, *Biology, *Food chains, Oceans, Food abundance, Food pyramids, Fish management, Fish harvest, Fish conservation, Fish, International waters, Marine fish, Marine fisheries, International commissions.

Present plans to maintain 200-mile coastal zones for fishing ignore the realities of ocean biology. Examined here is a system which would encourage the development of national fisheries. Since the vast majority of the world catch is in these waters, it would also encourage greater efficiency. While this system may function well both politically and militarily, it does not function well biologically. An increased efficiency of fish catch would disrupt, possibly forever, the possibility of sufficient future stocks. As of now, this fundamental fact is being ignored. (Frank-Florida)
W76-12007

INTERNATIONAL FISHERIES MANAGEMENT WITHOUT GLOBAL AGREEMENT: UNITED STATES POLICIES AND THEIR IMPACT ON THE SOVIET UNION,
Louisiana State Univ. Law Center, Baton Rouge.
H. G. Knight.
Georgia Journal of International and Comparative Law, Vol 6 p 119-142 (1976). 24 p, 97 ref.

Descriptors: *Jurisdiction, *International law, *Fisheries, *Fish management, *Treaties, Federal government, Legal aspects, Legislation, Oceans, Continental shelf, Economics, Permits, Fishing, Marine fish, Foreign countries.
Identifiers: *Coastal zone management.

The U.S. will adopt a 200-mile exclusive fishing zone in 1976 by way of the Magnuson bill. This will give the U.S. a superior bargaining position over the Soviet Union in the area of coastal fisheries exploitation. Other countries may make broad exclusive fishing zone claims, broad preferential

fishing zone claims, anadromous species claims, and multilateral and bilateral arrangements to take care of their fishing rights. Major facets of U.S. fishery policy are reviewed from 1954 to the present. Under the Magnuson bill, foreign nations will have to pay fishing rights fees set by the Secretary of Commerce. (Frank-Florida)
W76-12008

THE FREEDOM OF NAVIGATION UNDER INTERNATIONAL LAW,
London Univ. (England).
W. E. Butler.
Georgia Journal of International and Comparative Law, Vol 6, p 107-118 (1976). 12 p, 29 ref.

Descriptors: *International law, *Law of the sea, *Legal aspects, *Oceans, *Navigation, Negotiations, United Nations, Commercial fishing, Foreign waters, Foreign trade, Treaties, International waters, Boundaries(Surfaces), Boundary disputes.
Identifiers: *Coastal waters.

An informal negotiating text has emerged from the Geneva session of the Third U.N. Conference on the Law of the Sea. It still must be modified but tangible benefits can be expected from any draft treaty that follows. Should the Conference fail, however, to produce any revision of the law of the sea, it is possible that national demands for coastal water rights will be heard. Jurisdictional conflicts will then erupt as coastal states claim convergent economic and territorial rights. Navigation laws, in effect for centuries, could be disrupted as more and more of the ocean is claimed. Thus there is much riding on the Conference, as national pressures increase behind the scenes. (Frank-Florida)
W76-12009

THE FREEDOM OF NAVIGATION AND THE PROBLEM OF POLLUTION OF THE MARINE ENVIRONMENT,
Gosudarstvennyi Proektno-Izyskatelskii i Nauchno-Issledovatelskii Institut Morskogo Transporta 'Soyuzmorniiproekt', Moscow (USSR).
For primary bibliographic entry see Field 5G.
W76-12010

LIABILITY FOR MARINE ENVIRONMENT POLLUTION DAMAGE IN CONTEMPORARY INTERNATIONAL SEA LAW,
Gosudarstvennyi Proektno-Izyskatelskii i Nauchno-Issledovatelskii Institut Morskogo Transporta 'Soyuzmorniiproekt', Moscow (USSR).
For primary bibliographic entry see Field 5G.
W76-12011

RESPONSIBILITY AND LIABILITY FOR HARM TO THE MARINE ENVIRONMENT,
International Inst. for Environment and Development, Washington, D.C. North American Office.
For primary bibliographic entry see Field 5G.
W76-12012

FREEDOM OF SCIENTIFIC RESEARCH IN THE WORLD OCEAN,
Akademiya Nauk URSR, Kiev. Inst. of State and Law.
A. F. Vysotsky.
Georgia Journal of International and Comparative law, Vol 6, p 7-25 (1976). 19 p, 33 ref.

Descriptors: *International waters, *Research and development, *International law, *Oceans, *Legal aspects, International commissions, Foreign waters, Treaties, United Nations, Law of the sea, Research priorities, Water resources development, Projects, Testing, Planning.
Identifiers: *Ocean research.

Freedom of scientific research in international waters has never been fully accepted by the international community. With the coming of new national economic zone boundaries, there is a possibility that research will have limits imposed on both inside and outside these zones. A proposal exists now to grant an international authority the exclusive right to engage in scientific research. These possibilities are detrimental to the better use, understanding and research of the 'World Ocean', and should be rejected in favor of total research freedom. (Frank-Florida)
W76-12013

ZERO DISCHARGE: NATIONAL GOAL OR NATIONAL CALAMITY,
Allied Chemical Corp., New York.
For primary bibliographic entry see Field 5G.
W76-12014

THE ROLE OF NORTH AMERICAN DEEP WATER PORTS,
For primary bibliographic entry see Field 5G.
W76-12015

SALT MARSHES-ECOSYSTEMS IN DANGER,
Cape Cod Museum of Natural History, Brewster, Mass.
For primary bibliographic entry see Field 5G.
W76-12016

SUPERPORTS: THE NEED IS COMING,
Federal Maritime Commission, Washington, D. C.
For primary bibliographic entry see Field 5G.
W76-12017

HOW MODERN TECHNOLOGY IS ENDANGERING OUR LIVES: OCEAN POLLUTION,
For primary bibliographic entry see Field 5G.
W76-12018

PREPARING TO TAKE THE PLUNGE (ATLANTIC OFFSHORE OIL),
For primary bibliographic entry see Field 5G.
W76-12019

THE BATTLE OF LAKE SUPERIOR: RESERVE MINING'S BIG SEWER,
For primary bibliographic entry see Field 5G.
W76-12020

THE RICHES IN DAVY JONES'S LOCKER (1974 INTERNATIONAL LAW OF THE SEA CONFERENCE).
Newsweek, Vol 83, p 66-68, June 24, 1974. 3 p, 1 map, 2 photo.

Descriptors: *Foreign waters, *Law of the sea, *Oceans, *Treaties, *Exploitation, Fishing, Mining, International law, International waters, Pacific Ocean, Fish, Natural resources, Leases, Straits, Foreign trade, Coasts, Shores, Oil industry, Governments, Legal aspects, Manganese.
Identifiers: Off-shore oil drilling.

The International Law of the Sea Conference was convened to develop a treaty spelling out the economic and legal rights of all nations in the seas. A previous conference had given coastal nations the right to exploit their off-shore resources to a depth of 600 feet or deeper if technologically feasible. With the development of better equipment for dredging, a nation could claim resources hundreds of miles offshore. Two basic areas of agreement have been reached at the present conference. The first is to extend the territorial rights of a coastal nation to 12 miles out from the shore, while guaranteeing that the straits now treated as high seas would remain open to all ships. The second is to give coastal countries control over underwater resources within 200 miles of their shores thus requiring foreign corporations to negotiate rights to fish or mine within those areas. The major issue at the conference is how the area beyond the 200-mile limit will be mined. One suggestion is that a central sea-bed authority lease to multinational corporations who would then operate freely. The other is that all exploitation be closely controlled by a multigovernmental corporation. (Capehart-Florida)
W76-12021

THE UNTAPPED UNDERGROUND SEA OF PURE WATER,
For primary bibliographic entry see Field 4B.
W76-12022

THE WORLD'S LARGEST WATER PROJECT,
For primary bibliographic entry see Field 4A.
W76-12023

SQUEEZING MORE OUT OF THE SEAS.
Time, Vol. 104, p. 54-58, July 29, 1974. 5 p, 7 photo.

Descriptors: *Manganese, *Mining, *Beds under water, *Aquiculture, *International commissions, Oceans, Operations research, On-site tests, On-site laboratories, Seas, Exploration, Foreign research, Projects, Research equipment, Research facilities, Resources development, Technology, Testing, Metals, Oil, Mining engineering, Energy, Heat, Fisheries, Fish farming.

Marine scientists from many countries are busy sampling, probing and testing the seas and the seabed. Russian and American marine scientists working together in a joint marine research program called Norpax have discovered new facts in water currents and global tectonics. In addition they have discovered and charted the location of seabed manganese nodule deposits. Mining of these new manganese nodule deposits is being actively pursued by many corporations and nations. In addition, ocean sources of gas and promising oil sites in the deep oceans have been located. Scientists are also looking to harvest thermal currents in the oceans as another energy source. The article concludes with an examination of recent developments in aquiculture where emphasis is being placed upon harvesting plankton, and encouraging people to try eating some of the 30,000 to 40,000 underutilized fish varieties. (Hadoulias-Florida)
W76-12024

OCEANS, TECHNOLOGY AND LAW.
Akademiya Nauk SSSR, Moscow. Inst. of State and Law.
Moscow: Yuridicheskaya Literatura, 1972. 229 p. (Translation from Russian for NOAA National Marine Fisheries Service, Washington, D.C., Office of International Fisheries).

Descriptors: *Foreign countries, *Water resources development, *International waters, *Law of the sea, *International law, Legislation, Treaties, Technology, Sea water, Oceans, Political aspects, Legal aspects, Straits, Mining, Military aspects, Continental shelf.
Identifiers: *USSR.

This book examines the role of international law in regulating the exploitation and use of the world's oceans. Problem areas include: the territorial seas; straits; canals; Continental Shelf and seabed; fisheries; and the conservation of living resources. If mankind is fully to utilize technology for peaceful purposes, there must be rational development of methods to regulate exploitation of living and mineral resources in international waters. (See W76-12026 thru W76-12036) (Hadoulias-Florida)
W76-12025

PROBLEMS IN THE USE OF INTERNATIONAL STRAITS,
USSR Academy of Sciences, Moscow, Institute of State and Law.
P. D. Barabolya.
In: Oceans, Technology and Law, Chapter I, p 3-34, Moscow, USSR Academy of Sciences, 1972.

Descriptors: *Military aspects, *Ships, *Straits, *International waters, *Law of the sea, Navigation, Jurisdiction, Political aspects, Law enforcement, Treaties, Foreign countries, Continental shelf.
Identifiers: Historic straits, International straits, Archipelagic straits, Innocent passage.

This chapter examines Soviet proposals for a legal regime calling for freedom of navigation through major international straits and international routes, as well as for the prohibitions of military maneuvers in such areas. Straits are classified into the following legal categories: strait leading to the internal seas or bays of coastal states; 'historic' straits located on the outskirts of basic international routes which have economic and defense significance for a coastal state; archipelagic straits, specifically the Indonesian Archipelago, which permit 'innocent passage'; straits leading to closed seas of major importance to a small group of coastal states; and 'international straits' connecting the high seas and serving as world routes. Maximum territorial sea width in straits is currently three miles; however, unilateral extentions of limits suggest an acceptable new maximum of twelve miles provided a two or three mile 'center zone' is established as part of the 'high seas'. Coastal state jurisdiction and criminal jurisdiction will also be limited so that ships will enjoy full immunity from detainment and arrests while in transit. (See also W76-12025) (Hadoulias-Florida)
W76-12026

THE LEGAL SETTING OF INTERNATIONAL CANALS,
USSR Academy of Science, Moscow, Institute of State and Law.
O. F. Efendiev.
In: Oceans, Technology and Law, Chapter 2, p 34-43, Moscow, USSR Academyof Sciences, 1972.

Descriptors: *Canal zone, *Straits, *Military aspects, *Law of the sea, *International law, Navigation, Political aspects, Law enforcement, Treaties, *Canals, Inland waterways, Artificial watercourses, Foreign countries, International waters.
Identifiers: *Kiel Canal, *Suez Canal, Territorial command, Freedom of navigation, *International canals.

The Soviet Union believes that the Suez, Kiel, and Panama Canals are of such international importance in connecting high seas basins and serving as artificial waterways to closed seas as to call for principles of freedom of navigation. However, due respect must also be given to the sovereignty of the states through whose territory the waterways passes. User states must refrain from interfering in such country's internal political and international affairs. The Soviet Union objects to displays of armed aggression against the nationalization of the Suez Canal and the United Nations use of the Suez Canal for military purposes. In addition, the Soviet Union disapproves of the United Nations' position on the Panama Canal and of discriminatory measures taken by the American Zone authority towards vessels of Socialist States. The Soviet Union considers it necessary to eliminate military bases and demilitarize the Canal Zones as quickly as possible. (See also W76-12025) (Hadoulias-Florida)
W76-12027

THE STATUS OF HISTORIC WATERS (DOCTRINE AND PRACTICE),
USSR Academy of Sciences, Moscow, Institute of State and Law.
B. N. Nechaev.
In: Oceans, Technology and Law, Chapter 3, p 44-52, Moscow, USSR Academy of Sciences, 1972.

Descriptors: *Foreign countries, *International waters, *Law of the sea, *International law, Navigation, Political aspects, Law enforcement, Jurisdiction, Straits, History, Military aspects, Islands, Bays.
Identifiers: *Historic waters, *Historic bays, Archipelagos.

The 1958 International Convention on the Territorial Sea and Contiguous Zone lacks definitions and provisions concerning 'historic waters' and 'historic bays'. The norms of international maritime law are, therefore, controlling for activities of various countries in exercising sovereignty over 'historic waters'. It is generally recognized that 'historic waters' include straits, archipelagos, and bays. The following characteristic elements should be considered before classifying an area as a 'historic water': (1) the exercise of state authority over these waters for prolonged periods of time without opposition from the overwhelming majority of states; (2) the geographic condition of the bay, and its configurations; and (3) its economic and defense significance for that state. No unified opinion on the length of closing lines for bays has yet developed; consequently, states practices include exercise of jurisdiction over maritime areas adjacent to coasts which are vital to the state's security or economy. International experience has shown that states themselves first decide the condition and grounds upon which a bay is viewed as 'historic' and then international law sanctions the decision. (See also W76-12025) (Hadoulias-Florida)
W76-12028

LEGAL PROBLEMS OF THE TERRITORIAL SEA REGIME,
USSR Academy of Sciences, Moscow, Institute of State and Law.
L. V. Speranskaya.
In: Oceans, Technology and Law, Chapter 4, p 53-77, Moscow, USSR Academy of Sciences, 1972.

Descriptors: *Foreign countries, *Fishing, *Jurisdiction, *International waters, *Law of the sea, International law, Boundary disputes, Sea water, Coasts, Oceans, Continental shelf, Political aspects, Legal aspects, Fisheries.
Identifiers: *Territorial waters, *International Law Commission, *Territorial sea zone, Innocent passage.

The legal regulation of territorial waters, including questions regarding the breadth of the territorial seas, must take into account the level of scientific activity presently taking place in coastal seas. 'Territorial waters' means a belt of maritime space adjacent to the coastal state and measured either by a low-tide line or by the use of a straight baseline. The International Law Commission recognizes a twelve mile breadth extending into airspace above the territorial sea, as well as to the seabed and subsoil. Some states, however, in violation of international law, have declared a 200 mile wide territorial sea zone using self-defense as justification. These states require other nations to purchase licenses for exorbitant sums before allowing fishing within the 200 mile zone. However, they reserve sanitary and other pollution controls to a 12 mile zone only. (See also W76-12025) (Hadoulias-Florida)
W76-12029

THE OUTER BOUNDARY OF THE CONTINENTAL SHELF,
USSR Academy of Science, Moscow, Institute of State and Law.
S. N. Smirnov.
In: Oceans, Technology and Law, Chapter 5, p 78-98, Moscow, USSR Academy of Sciences, 1972.

Descriptors: *Foreign countries, *Jurisdiction, *Continental shelf, *International waters, *Law of the sea, International law, Boundary disputes, Legal aspects, Legislation, Sea water, Oceans, Military aspects, Water resources development, International commissions.
Identifiers: *Exploitability criteria, *International Law Commission, Geneva Convention.

The Continental Shelf, a rich source of minerals, needs special legislation delineating boundaries for spatial expansion of coastal states' sovereign rights. Relevant definitions and proposals for such legislation are included within this chapter. The most widespread definition of 'Continental Shelf' is the 'exploitability criteria' which states that the entire world ocean floor can be divided by median lines between coastal states. However, the International Law Commission after much debate adopted the geographical meaning of continental shelf. While outer boundaries of the Continental Shelf remain unclear, international legal norms allow coastal states sovereign rights over exploration and exploitation of the territorial sea to two hundred miles. Spatial extention of exploitability is limited only by the need for submarine regions to be contiguous to coastal states or islands. The United States agrees on the two hundred mile territorial sea, but recommends supervision by international trustees. (See also W76-12025) (Hadoulias-Florida)
W76-12030

THE DELIMITATION OF THE NORTH SEA CONTINENTAL SHELF,
Akademiya Nauk SSSR, Moscow. Inst. of State and Law.
A. L. Kolodkin.
In: Oceans, Technology and Law, Chapter 6, p 99-113, Moscow, USSR Academy of Sciences, 1972.

Descriptors: *Foreign countries, *Jurisdiction, *Continental shelf, *International waters, *Law of the sea. International law, Boundary disputes, Judicial decisions, Geographical regions, Political aspects, Legal aspects, International commissions, Beds, Water resources development.
Identifiers: Equidistance(Legal), Geneva Convention.

The International Court of Justice in 1969 examined differing principles for delimiting the Continental Shelf of the North Sea. Article 6 of the 1958 Geneva Convention provided for delimitation by agreements between states, or, in the absence of such agreements or special circumstances justifying another boundary, according to principles of equidistance. The Court decided that since the articles of the Convention did not bind non-Convention members, equidistance was not the sole method available for delimiting the Continental Shelf of the North Sea. The Court felt that other factors, such as the general configuration of the coast line, the physical and geological structure of the Shelf Area, and elements of 'reasonable proportionality' should also be taken into consideration. The Soviet Union's position is that the Rules of Article 6 and of other Convention articles are rules of Customary International Law and, therefore, binding on all states. Furthermore, the principle of equidistance should be applied only in the absence of specific agreements or special circumstances. (See also W76-12025) (Hadoulias-Florida)
W76-12031

SCIENTIFIC-TECHNOLOGICAL PROGRESS AND THE SEARCH FOR LEGAL REGULATION OVER POSSIBLE USES OF THE OCEAN FLOOR,
Akademiya Nauk SSSR, Moscow. Inst. of State and Law.
M. I. Lazarev.
In: Oceans, Technology and Law, Chapter 7, p. 114-129, Moscow, USSR Academy of Sciences, 1972. 16 p.

Descriptors: *Foreign countries, *Water resources development, *International waters, *Law of the sea, *International law, Regulation, Oceans, Subsoil, Geographical regions, Legal aspects, Technology, Political aspects, Treaties, International commissions, Mining, Ownership of beds.
Identifiers: *Seabeds, *Freedom of the high seas.

Various legal viewpoints have been presented for regulating development of the ocean floor and subsoil. These viewpoints include the 'legal vacuum', 'belonging to no one', 'belonging to everyone', and the 'common property of all mankind' concepts. The United Nations (UN) General Assembly adopted the last of these, to which the Soviet Union made the following objections: (1) the concept calls for equal rights to world ocean resources but ignores the basic differences between developed and underdeveloped states; (2) artificial divisions into nations 'working on the sea' and those 'reaping fruits of the sea' are created in contradiction to the UN Charter; (3) the concept may hinder scientific research and curtail technological initiatives; and (4) political propaganda for 'sharing the seabed' is beneficial to imperialistic powers. The Soviet Union suggests that until there arises a treaty regime mutually acceptable to all states for the common use of the seabed and subsoil, these areas should be commonly used by all states under principles of freedom of the high seas. (See also W76-12025) (Hadoulias-Florida)
W76-12032

LEGAL REGULATION OF SEABED USES BEYOND THE LIMITS OF THE CONTINENTAL SHELF,
Akademiya Nauk SSSR, Moscow. Inst. of State and Law.
G. F. Kalinkin.
In: Oceans, Technology and Law, Chapter 8, p. 130-70, Moscow, USSR Academy of Sciences, 1972. 41 p.

Descriptors: *Foreign countries, *Water resources development, *International water, *International law, *Continental Shelf, Regulation, Oceans, Legal aspects, Political aspects, Resources, Treaties, Legislation, Mining, Ownership of beds, Boundary disputes.
Identifiers: *Demilitarization, *Seabeds, Convention on the High Seas.

This chapter deals with several issues relating to the exploitation and use of the seabed. The Convention on the High Seas has confirmed that 'freedom of the high seas' also extends to the seabed. Consequently, a Disarmament Committee Treaty providing for demilitarization of the seabed has been approved. Various legal studies calling for establishment of an international legal regime for exploitation of seabed resources are reviewed. Also analyzed are U. N. studies advocating international machinery for regulation of the seabed by registering claims for seabed resource exploitation through licensing procedures, or by conducting such exploitation under the supervision of an independent international agency. The American Draft Convention, by comparison, has proposed an international trusteeship area where states adjacent to the area would have power to issue licenses for exploitation of seabed mineral resources. The Soviet Union, however, deems it unnecessary to develop international machinery until boundaries of national jurisdiction for the seabed have been established. Also discussed is the UN proclamation declaring the seabed and the ocean floor to be the 'common heritage of mankind'. (See also W76-12025) (Hadoulias-Florida)
W76-12033

INTERNATIONAL-LEGAL PROTECTION OF THE SEAS FROM POLLUTION,
Akademiya Nauk SSSR, Moscow. Inst. of State and Law.
Ya. A. Ostrovski.
In: Oceans, Technology and Law, Chapter 9, p 171-93, Moscow, USSR Academy of Sciences, 1972.

Descriptors: *Foreign countries, *Oil spills, *International waters, *Law of the sea, *International law, *Oil pollution, Pollution, Legal aspects, Political aspects, Legislation, Treaties, Radioactivity effects, Ecology, Environmental effects, Water pollution effects, Oceans, International commissions.
Identifiers: *Law of the Sea Conference.

The danger of oil pollution in international waters is critical. Pollution control measures began in 1926 when a preliminary conference of experts drafted an agreement recommending the establishment of government zones in which the discharge of gasoline and other harmful mixtures would be prohibited. Other conventions followed. Discussed are the International Convention in London in 1954 and the 1962 Amendments thereto which established different regimes according to ship type; the 1969 North Sea Convention; the 1969 Baltic Sea Convention; and the 1969 Conference in Rome and Brussels. In addition to oil pollution, other dangerous areas of pollution examined includes pollution in rivers and internal reservoirs from sewage, industrial wastes, various chemical substances, and radioactive contaminations. The Geneva Law of the Sea Conference recognized the need to adopt international measures to prevent dumping radioactive wastes into the sea. With modern technological advances, possible uses of the world's oceans are limited only by the dangers of pollution. (See also W76-12025) (Hadoulias-Florida)
W76-12034

INTERNATIONAL-LEGAL REGULATION OF MARINE FISHERIES,
A. A. Volkov.
In: Oceans, Technology and Law, Chapter 10, p. 194-209, Moscow, USSR Academy of Sciences, 1972.

Descriptors: *Foreign countries, *Jurisdiction, *International waters, *Law of the Sea, *Fisheries, Regulation, Oceans, Legal aspects, Legislation, Political aspects, Fish, Fish management, International commissions.
Identifiers: *Law of the Sea Conference.

Effective regulatory methods are necessary to control the exploitation of the living resources of the world's oceans. The most urgent concerns involve the establishment of a territorial sea width and fishing zone, and the resolution of problems of coastal states' rights in the high seas and in marine fisheries. The regulation of fisheries is complicated by differing international legal regimes concerning internal waters, territorial seas, high seas, and the Continental Shelf. The situation is further aggravated by the inability of the Law of the Sea Conferences to reach agreement on general rules establishing maximum limits for the breadth of territorial seas and fishing zones. Of particular interest are the positions expressed by American and Canadian fishermen, and the tendency of individual coastal states unilaterally to seize vast areas of the high seas. The Soviet Union objects to the organized activity by capitalist coastal states against Soviet fisheries. The Soviets especially object to the establishment of official prohibitions on port ships for Soviet fishing vessels in Canadian, Mexican and Australian Pacific Ocean ports. (See also W76-12025) (Hadoulias-Florida)
W76-12035

INTERNATIONAL-LEGAL PROTECTION OF THE LIVING RESOURCES OF THE SEA,
Akademiya Nauk SSSR, Moscow. Inst. of State and Law.
G. A. Nekrasova.
In: Oceans, Technology and Law, Chapter 11, p 210-226, Moscow, USSR Academy of Sciences, 1972.

Descriptors: *Foreign countries, *Water resources development, Technology, *International waters, *Law of the sea, Legislation, Pollution, Water pollution, Treaties, Regulation, Environmental effects, Conservation, Resources, Sea water, Oceans, Aquatic animals, Aquatic life, Mining wastes.
Identifiers: *Declaration on the Continental Shelf of the Baltic Sea.

The living resources of the Baltic Sea urgently need protection to prevent their extermination by harmful side effects of scientific progress. Resolution of technology caused problems is proceeding through international programs and agreements for joint exploitation of marine resources. International organizations are also conducting scientific studies of marine living resources and conservation measures. There were no international agreements for the conservation of living resources of the sea prior to 1911, but since then a number of international conferences have been devoted to the problem. The Soviet Union has given high priority to protecting the Baltic Sea. A number of international scientific conventions have discussed Baltic Sea pollution concerns; however, up to now the Baltic States have not concluded any regional agreement assuring protection of the area. Thus the Declaration on the Continental Shelf of the Baltic Sea should play an important political and legal function in protecting Baltic Sea ecology. (See also W76-12025) (Hadoulias-Florida)
W76-12036

WORLD ENVIRONMENTAL QUALITY.
Department of State, Washington, D.C.
For primary bibliographic entry see Field 6G.
W76-12037

THE SWALE,
Spessard L. Holland Law Center, Gainesville, Fla.
J. J. Altman, Jr.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida 32611, $1.25. June 4, 1976, 25 p.

Descriptors: *Florida, *Surface drainage, *Natural flow doctrine, *Landfills, *Obstruction to flow, *Reasonable use, Alteration of flow, Relative rights, Riparian rights, Riparian waters, Ditches, Grassed waterways, Surface runoff, Surface waters, Drainage patterns(Geologic), Damages, Land tenure, Permits.
Identifiers: *Swales.

A 'swale', which is a watercourse carrying surface runoff, may contain flowing water all year-round or may serve only during flooding or rainfall periods. A swale may be natural, man-made or natural but enlarged artificially. In considering the right of a property owner to fill a swale, the natural or artificial nature of the waterway is important. Under Florida law a swale, as a 'man-made trench which is water filled only during rainfall', may be constructed and maintained without a permit. Under Federal law a similar provision exempts man-made ditches. Natural watercourses, however, may be subject to Federal Water Pollution Control Act jurisdiction and may present state common law problems. Under Florida law a landowner may not block natural drainage of upper lands. In addition, the lower landowner is required to submit to all natural drainage running in a natural direction. If the swale is entirely man-made, however, and is not an improved natural drainage course, a landowner may fill the ditch. Fill would also be allowed if the ditch were carrying water other than surface drainage, as when a ditch drains a water body. Except in these limited instances, however, filling is not permitted. (Comer-Florida)
W76-12038

NAVIGABLE WATER, A DEFINITION: ALL BENT OUT OF SHAPE,
Spessard L. Holland Law Center, Gainesville, Fla.
M. G. Madorsky.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida 32611, $2.20. (1975), 44 p.

Descriptors: *Federal jurisdiction, *Navigable waters, *Rivers and Harbors Act, *Federal Water Pollution Control Act, Legislation, Constitutional law, Common law, Regulation, Water pollution Control, Water law, History, Rivers, Jurisdiction.
Identifiers: *Navigability test, *FWPCA Amendments of 1972, Oil Pollution Act, Navigation obstructions.

The Federal Constitution grants Congress the power to regulate the navigable waters of the country under the Commerce Clause. The earliest judicial interpretation of navigable waters was based upon the English rule and encompassed only tidal waters. Since many major river systems were thus excluded, the United States Supreme Court adopted the 'navigability in fact test'. This test included all waters that were used or susceptible of use in their natural condition as commercial highways. Eventually, interstate waters, waters capable of improvement to become navigable as well as tributary waters to navigable waters were brought under federal jurisdiction by judicial broadening. With the beginnings of pollution concern, federal legislation was used to regulate navigable waters. The legislation was not completely effective, however, because of the scope of federal jurisdiction. The Federal Water Pollution Control Act Amendments of 1972 purported to apply to all waters in the United States. Since the act has been found constitutional, the broader scope of jurisdiction promises better result. (Comer-Florida)
W76-12039

WATERS: NUMBERLESS YET MEAGER,
Spessard L. Holland Law Center, Gainesville, Fla.
A. B. Parker.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida 32611, $1.35. August 1975, 27 p.

Descriptors: *Florida, *Water conservation, *Water demand, *Water supply, *Water shortage, Saline water intrusion, Water levels, Aquifers, Riparian rights, Use rates, Water utilization, Water rates, Water costs, Water policy, Water management(Applied), Water distribution(Applied), Water resources development, Water law.
Identifiers: Water rights(Non-riparian).

Despite ample rainfall, Florida is now faced with water conservation problems. The tremendous population growth of the state and inefficient drainage systems have resulted in lower aquifers in southern portions of the state. Because of lower aquifers, salt water intrusion has become a growing concern. Solutions to these problems are not easy. For example, any attempt to impose population growth limits would present unfavorable constitutional issues. As to the water shortage problem, borrowing water from neighboring states can be a temporary measure at best since many drier states may well balk at transporting water to wet Florida. One possible answer to the difficulty is water use charges. Massive amounts of water are currently used for industrial and agricultural purposes, with much of it free because of the riparian rights system now governing water law in the state. These riparian rights have resulted in depletion of a natural resource at a time when depletion has become a serious problem. If major users are made to pay for the water they use, use rates may be reduced for the remainder of the public. (Comer-Florida)
W76-12040

AGRICULTURAL PRACTICES TO REDUCE NON-POINT POLLUTION IN THE OKEECHOBEE-KISSIMMEE BASIN,
Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.
L. B. Baldwin.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida 32611, $3.10 May 1975. 62 p, 1 fig, 6 tab.

Descriptors: *Agricultural runoff, *Florida, *Lake basins, *Farm wastes, *Confinement pens, Feed lots, Livestock, Cattle, Fertilizers, Crop production, Phosphorus compounds, Nitrogen compounds, Surface runoff, Vegetation effects, Wetlands, Drainage water, Water pollution sources, Water pollution treatment, Water pollution control.
Identifiers: Non-point sources(Pollution), *Okeechobee-Kissimee Basin(Fla).

Agricultural sources of non-point source pollution in the Okeechobee-Kissimmee Basin of Florida are predominantly dairies, beef production in improved pastures, sugarcane and vegetables on mucklands, and citrus on drained soils. Cattle production contributes significant amounts of phosphorus while crop production is the main source of nitrogen. Quantities of both elements can be reduced by utilization of wetlands to slow runoff and increase nutrient uptake prior to discharge into waterways. Use of methods to prevent herd cattle from congregating around drainage areas can keep manure from accumulating and flushing into drainage facilities. Feeding areas should also be spread out away from drainage areas and vegetable cover maintained to prevent nutrient wash-off. Dairy operations require a close confinement of cattle for long periods. This makes capture and disposal of wastes both necessary and feasible. If feed crops are raised the expense of waste collection can be mitigated. (Comer-Florida)
W76-12041

LEGAL STANDARDS FOR DETERMINING THE ORDINARY HIGH WATER MARK,
Spessard L. Holland Law Center, Gainesville, Fla.
R. W. Winesett.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida 32611, $1.75. 1972, 35 p.

Descriptors: *Florida, *Boundaries(Property), *High water mark, *Fluctuations, *Water levels, Texas, Arizona, Utah, Oklahoma, Oregon, Water law, Banks, Ownership of beds, Seashores, Tidal waters, Judicial decisions, Legal aspects.

Legal standards for ascertaining the ordinary high water mark have never been clear. Examined here is federal and Florida case law, as well as that of Texas, Arizona, Utah, Oregon and Oklahoma. In general, it appears that the ordinary high water mark (OHWM) is the outer limit of the land beneath navigable waters. However, the OHWM is a question of fact, to be determined by visual examination of the bank. While physical evidence has been accepted in the form of changed soil appearance at the water's edge or lack of terrestrial vegetation, the cases are by no means uniform. Thus, while it is a question of fact that determines the OHWM, as yet there is no universally accepted standard. (Frank-Florida)
W76-12042

EBB AND FLOW: NAVIGABILITY AND THE CORPS OF ENGINEERS WASHED IN THE TIDE OF ENVIRONMENTAL PROTECTION,
Spessard L. Holland Law Center, Gainesville, Fla.
C. P. Tittle.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida 32611, $1.60. 1972. 32 p, 2 append.

Descriptors: *Wetlands, *Judicial decisions, *Jurisdiction, *Federal government, *Dredging, Legislation, Legal review, Water policy, Constitutional law, Federal jurisdiction, Florida, Water law, High water mark, Landfills.

Navigability has been the cornerstone of federal power to enforce environmental wetland protection. Under the Commerce Clause and federal jurisdiction, the Corps of Engineers has issued and withheld permits for dredging and filling until 1970, however, jurisdiction had always depended on navigability of a waterbody. In 1970 a Fifth Circuit decision, Zabel v. Tabb, allowed the Corps to consider environmental factors in issuing permits. This landmark decision was implemented by a federal court in Florida which granted a permanent injunction against dredging, and even went so far as to order repairs. These Florida cases have greatly expanded the breadth of federal protection for wetlands. To a large degree, state power has been pre-empted, while the reach of the Commerce Clause has been greatly expanded. (Frank-Florida)
W76-12043

PUBLIC SERVITUDE FOR NAVIGATION ON ARTIFICIAL WATERS AND THE COMMERCE CLAUSE,
Spessard L. Holland Law Center, Gainesville, Fla.
R. L. Wilkes.
Available from Eastern Water Law Center, University of Florida, Gainesville, Fl. 32611. $1.55. (1973), 31 p.

Descriptors: *Artificial watercourses, *Florida, *Constitutional law, *Federal jurisdiction, *Navigable rivers, Navigable waters, Navigation, Water law, Legislation, Legal aspects, Judicial review, State governments, State jurisdiction, Beneficial use, Public rights.

The Commerce Clause of the Constitution, and the power of Congress to regulate navigable waters, constitute the foundation of all federal power over rivers and other waterways. Where artificial waterways are concerned, there are two ways to bring them within the Commerce Clause since they are not otherwise covered. First, one may show that the waterbody is in fact navigable; or second, one may show that it is navigable because it is capable of improvements. There is little case law dealing with Federal power in this area, but state case law is extensive. The author, after discussing cases from around the nation, concludes that whether or not public rights existed in a waterbody in its natural condition will determine whether public rights exist after it is made navigable by artificial means. Florida law on this point, both statutory and judicial, is also discussed. (Frank-Florida)
W76-12044

THE BENEFICIAL USE OF WATER RESOURCES AND GUIDELINES FOR ALLOCATION OF WATER RESOURCES IN TIMES OF EMERGENCY,
Spessard L. Holland Law Center, Gainesville, Fla.
D. L. Rankin.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida 32611, $1.85. March 1973, 37 p.

Descriptors: *Beneficial use, *Water allocation(Policy), *Water resources, *Droughts, *Florida, Riparian rights, Riparian land, Appropriation, Prior appropriation, Water rights, Water law, Texas, Idaho, California, Adoption of practices, State governments.
Identifiers: *Public trust doctrine.

Examined here are the beneficial uses of water resources in Florida, and guidelines for water resource allocation in times of emergency. Both are affected by the Florida Water Resources Act of 1972 which replaces certain common law con-

ANTWERP (DE BESTRIJDING VAN DE VERONTREINIGING VAN HET OPPERVLAKTEWATER IN DE ESSO-RAFFINADERIJ TE ANTWERPEN),
For primary bibliographic entry see Field 5D.
W76-12416

RECENT DEVELOPMENTS IN TANNERY EFFLUENT DISPOSAL,
Rhodes Univ., Grahamstown (South Africa). Leather Industries Research Inst.
For primary bibliographic entry see Field 5D.
W76-12425

EVALUATION OF PROPOSED SEWAGE SLUDGE DUMPSITE AREAS IN THE NEW YORK BIGHT.
National Oceanic and Atmospheric Administration, Boulder, Colo. Marine Ecosystems Analysis Program Office.
Technical memorandum NOAA TM ERL MESA-11, February 1976. 212 p, 103 fig, 22 tab, ref, append.

Descriptors: *Soil disposal fields, *Sewage sludge, *Sludge disposal, Environmental engineering, Ecosystems, Water pollution, Waste disposal.
Identifiers: *Dumpsites, *Disposal procedure, *Sea bed, Coastal waters, Water columns, *New York Bight.

Presented are summaries of significant features of the New York Bight's midshelf environment and alternative sewage sludge dumpsite areas 1-A and 2-A, conclusions about the effects of dumping sewage sludge at any interim dumpsite in this environment, and specific recommendations relative to dumping operations and monitoring activities. (NOAA)
W76-12469

ULTIMATE DISPOSAL OF BIOLOGICAL SLUDGES -- A NOVEL CONCEPT,
B.C. Research, Vancouver.
E. G.-H Lee, J. C. Mueller, and C. C. Walden.
Pulp and Paper Canada, Vol. 77, No. 6 p 88-90, 92-95 (T104-110), June, 1976. 8 fig, 17 ref, 4 tab.

Descriptors: *Sludge disposal, *Activated sludge, *Pulp wastes, Biological treatment, Oxidation, Hydrolysis, Recycling, Effluents, Costs, Estimated costs, Wastes, Industrial wastes, Waste treatment, Water pollution sources, Water pollution treatment, Suspended solids, Sludge, Solid wastes, Sodium compounds, *Ultimate disposal.
Identifiers: Kraft mills, Sodium hydroxide.

The disposal of sludges from activated sludge systems involves digestion in 0.1 N NaOH for 2 hr at 50-70 C, recycling the hydrolyzate to the biosystem, and complete biological oxidation to carbon dioxide and water. Results of tests with kraft mill effluents indicate that the process reduces approximately 5-fold the amount of sludge requiring ultimate disposal. Treatment costs are estimated at $1.81/air-dry ton of pulp. Additional benefits of this process include improvement of sludge settleability and low suspended solids in clarified effluents. (Sykes-IPC)
W76-12481

THE DISPOSAL OF WASTES INTO THE SEA OF THE PROVINCE OF ROME (ITALY), (IN ITALIAN),
P. Zucchetti, M. Floccia, and G. Palmieri.
Ann Sclavo. 16(4), p 393-412, 1974.

Descriptors: *Waste disposal, Coasts, *Public health, *Water quality, *Waste treatment, *Organic wastes.
Identifiers: Rome Province(Italy).

The most important causes of the continuous increase of the amount of refuse and the negative consequences of this waste on human health and on the quality of the environment are reviewed. Modern technical advances in methods of waste treatment and disposal of organic wastes in the sea are discussed. The methods presently used in the urban coastal centers of the province of Rome for waste treatment and marine disposal are covered.--Copyright 1975, Biological Abstracts, Inc.
W76-12570

DEVELOPMENT OF RESIDUALS MANAGEMENT STRATEGIES,
Indiana Univ., Bloomington. School of Public and Environmental Affairs.
For primary bibliographic entry see Field 5G.
W76-12581

COLESHILL (2): INCINERATING SEWAGE SLUDGE,
Water, No. 8, p 23-24, May, 1976. 1 fig.

Descriptors: *Sludge treatment, *Sludge disposal, *Incineration, *Dewatering, *Treatment facilities, Waste treatment, Equipment, Sewage sludge, Sewage treatment.
Identifiers: United Kingdom.

A description of the Severn Trent Water Authority's sewage sludge incineration plant at Coleshill, England is provided. The plant handles sludge from sewage treatment plants in the area which amounts to about 3500 cu m/day. The sludges which contain about 95% water are initially passed through mechanically raked screens for removal of gross solids and are then directed to storage tanks where they can be held, mixed, or transferred. The sludges are next chemically treated to assist dewatering and are stirred and air-agitated to ensure thorough mixing. After conditioning, the sludge is dewatered by pressure to produce a solid sludge cake containing 65% moisture. The sludge cake is incinerated in two of three furnaces which operate at any one time. The liquid produced by dewatering is pre-treated at the incinerator so that it may be processed with normal sewage at the nearby sewage treatment plants. (See also W76-12609) (Kreager-FIRL)
W76-12610

COMPACT INCINERATOR FOR SOLID AND LIQUID WASTES.
Processing, Vol. 22, No. 5, p 33, May, 1976. 1 fig, 1 tab.

Descriptors: *Sludge disposal, *Sewage disposal, *Oil wastes, *Incineration, Waste disposal, Equipment, Solid wastes, Liquid wastes, Sludge.

A small, self-contained incinerator known as the 'Furnapak' which incorporates several design features of larger multiple hearth furnaces is available for applications involving the burning of sewage screening, oily wastes, and sewage sludges. The incinerator uses a rotating rabble shaft and air injection in a manner similar to multiple hearth furnaces. Both solid and liquid wastes can be incinerated either simultaneously or independently. Solid waste is loaded manually onto a solid bowl refractory hearth through an air-operated door large enough to accommodate standard refuse sacks. Liquid wastes and pumpable sludge are introduced into the incinerator through a tangentially mounted inlet port. Problems of burner blockage are avoided by the use of a simple weir type burner in which the fuel falling over the weir is atomized by low pressure air from the main combustion air fan. Any mixture of waste oil, oily water, sewage, and other sludges containing solids particles up to 0.5-inches in size can be handled efficiently. The incinerator is capable of feed rates up to 350 kilograms/hour for feeds containing up to 80% moisture. (Kreager-FIRL)
W76-12612

SUBMERSIBLE PUMPS UPGRADE SEWAGE HANDLING.
For primary bibliographic entry see Field 5D.
W76-12614

SLUDGE TREATMENT, UTILIZATION, AND DISPOSAL, (LITERATURE REVIEW),
Delaware Univ., Dept. of Civil Engineering. Newark.
For primary bibliographic entry see Field 5D.
W76-12630

SOD PRODUCTION: AN EXPERIMENT IN SLUDGE DISPOSAL,
Florida Public Works Administration, St. Petersburg.
W. T. White, Jr.
Public Works, Vol. 107, No. 6, p 104-106, June, 1976. 2 fig, 1 tab.

Descriptors: *Turf, *Sludge disposal, *Sludge, *Topsoil, *Land use, Mixing, Grasses, Tile drainage, Soil types, Ditches, Solid wastes, Moisture, Waste disposal.
Identifiers: Sandy soils, Land application, Sod production.

A project was begun in St. Petersburg, Florida, to use sludge from waste water treatment plants to develop topsoil and eventually grow sod for city parks and recreation areas. Sludge was distributed into furrows dug by a tractor and then blended with the soil using a tractor attachment. During the first yr, an 18 inch layer of topsoil was created, which produced superior grass growth when transferre to city parks and street parkways. A 23-acre area was used. The site was completely tile-drained at an average depth of 3.5 ft. The sandy soil had an interference of shell commencing at a depth of about 24 inches. The area was bordered by a 6 ft deep drainage ditch whose contents were pumped to a holding pond south of the site. Sludge solids were retained at the soil surface, part of the moisture evaporated, and any excess was collected bydrain tile and carried to the drainage ditch. Sludge spraying was discontinued for 3 days after a heavy rain, because an inch of rain contributed moisture equivalent to 3 days of operation. (Snyder-FIRL)
W76-12633

PERSISTENCE OF VIRUS ON SEWAGE-IRRIGATED VEGETABLES,
Ohio Bureau of Foods, Cincinnati. Virology Branch.
For primary bibliographic entry see Field 5B.
W76-12634

ALUM SLUDGE DRYING WITH BASIC EXTRACTIVE TREATMENT,
Resources Conservation Co., Renton, Wash.
R. L. Olson.
American Water Works Association Journal, Vol. 68, No. 6, p 321-323, June, 1976.1 fig, 2 tab.

Descriptors: *Sludge, *Drying, *Sludge treatment, *Solvents, *Organic matter, Inorganic compounds, Dewatering, Economics, Suspended solids, *Waste treatment.
Identifiers: *Basic extractive sludge treatment.

A new system has been developed to reduce problem sludges, including alum, to a dry state suitable for recycling or landfilling. The method, called B.E.S.T. (basic extractive sludge treatment), utilizes a solvent with unique properties that conditions both organic and inorganic sludges while enhancing the solids' dewatering and separation properties. The overall relative economics of the process depend on the specific sludge to be processed, the nature of existing alternatives for sludge disposal, and the availability of existing component hardware that can be incorporated into it. The process can satisfy all applicable Environ-

mental Protection Agency (EPA) guidelines. When a combination of the solvent and water is cooled below approximately 65 F, they become completely mixed, whereas suspended solids contained in a liquid mixture are easily separated mechanically. Raising the liquid temperature to approximately 140 F allows the water and solvent to be separated by decanting. A Mini-B.E.S.T. unit was tested with various sludges to test the validity of the system. All system design goals were met during this testing. When the system was tested with alum sludge, the 52% liquid remaining in the filter cake was all solvent. The solvent has an evaporative value of 135 Btu/lb as opposed to approximately 1000 Btu/lb for water, resulting in one of the major energy economies in the B.E.S.T. system. The Mini-B.E.S.T. system was able to remove over 99% of the suspended solids from an organic sludge slurry and deliver 95% or more dry, pathogen-free solids and a clear, sterile effluent. Energy requirements are relatively low and environmental impact is negligible. (Snyder-FIRL)
W76-12641

TURN SEWAGE INTO FUEL.
For primary bibliographic entry see Field 5D.
W76-12643

EFFLUENT IRRIGATION OF RYE AND RYEGRASS,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W76-12644

PHILADELPHIA SLUDGE: WHERE TO PUT IT.
Civil Engineering-ASCE, Vol 46, No 6, p 60-62, June, 1976.

Descriptors: *Sewage treatment, *Sludge disposal, *Ultimate disposal, *Pennsylvania, *Sewage sludge, Atlantic Ocean, Land use, Oceans.
Identifiers: *Philadelphia(Penn).

Philadelphia dumps at least part of its sewage sludge in the open ocean, but the Environmental Protection Agency (EPA) has ordered it to discontinue this practice by 1981. Increased mercury, nickel, lead, and nitrate concentrations have been detected at the dumpsites. There was no apparent evidence of accumulation of organics and nutrients or changes in phytoplankton populations. Philadelphia officials believe that the dumping should not be banned. They are, however, evaluating 10 treatment-disposal alternatives. These include giving away the dried sludge for use as a fertilizer. A Recycling Center may also be set up to handle sludge for shipment. Sludge will be applied on a trial basis to farmland south of the city. Use of sludge to reclaim strip-mined lands has also been considered. Because of expected objections, Philadelphia will cooperate with several universities in studying sludge application to strip-mined land. In similar tests using Scranton sludge, the alkaline sludge helped neutralize the acidic strip-mined land and added humus. (Snyder-FIRL)
W76-12657

5F. Water Treatment and Quality Alteration

SEVERAL HYDROBIOLOGICAL PROBLEMS OF GROUND WATER STORAGE IN METROPOLITAN WATER WORKS (BUDAPEST): I, (IN GERMAN),
Lajos Kossuth Univ., Debrecen (Hungary). Zoological Inst.
J. Szabo, G. Pusztai, G. Devai, I. Devai, and K. Gefferth.
Acta Biol Debrecina. 10/11, p 191-200, 1972/1973.

Descriptors: Europe, *Hydrobiology, *Water storage, Groundwater basins, *Water works, *Colloids, *Detritus, Municipal water, Cities, *Silts, *Design, Maintenance, Treatment facilities.
Identifiers: Budapest(Hungary), Colloids.

Plans are discussed for the optimum design and maintenance of a purification basin to prevent the transfer of fine silt, organic and inorganic colloids and detritus to the storage basin, since this is the cause of its occasional blockage.--Copyright 1975, Biological Abstracts, Inc.
W76-12258

A NEW STANDARD 'DRINKING WATER' (GOST 2874-73) AND ITS SCIENTIFIC BASIS, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).
For primary bibliographic entry see Field 5G.
W76-12317

PRELIMINARY STUDIES OF ASBESTIFORM FIBERS IN DOMESTIC WATER SUPPLIES,
California Univ., Berkeley.
For primary bibliographic entry see Field 5A.
W76-12325

HYGIENIC EVALUATION OF ELECTRODIALYSIS WATER DESALINATION SET UP, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of General Hygiene; and Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Public Hygiene.
For primary bibliographic entry see Field 5D.
W76-12394

ALUM RECOVERY AND WASTE DISPOSAL IN WATER TREATMENT,
Metcalf and Eddy, Inc., New York. (Assignee).
G. P. Fulton.
U. S. Patent No. 3,959,133, 4 p, 3 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 946, No 4, p 1739, May 25, 1976.

Descriptors: *Patents, *Water treatment, *Water purification, *Water quality control, Treatment facilities, Sludge treatment, Sludge disposal, Suspended solids, Coagulation.
Identifiers: *Alum(Aluminum sulfate) recovery.

In water treatment plants, particularly for large municipalities, alum (aluminum sulphate) is commonly used in the coagulation and clarification process. During the treatment the alum is converted essentially to aluminum hydroxide. The aluminum hydroxide, together with suspended solids including suspended matter in the raw water, precipitates resulting from the treatment process, additives, etc form a sludge which must be disposed of. The invention is directed to the provision of a water treatment system and process which normally utilizes alum recovery and yields a neutral cake for convenient disposal, provides for periodic elimination of contaminated recovered alum, and permits operation without alum recovery when required by abnormal conditions. (Sinha - OEIS)
W76-12399

APPARATUS FOR BIOLOGICAL AND CHEMICAL PURIFICATION OF WATER BY AGGLOMERATION,
Agrotechnika, narodny podnik, Zvolen (Czechoslovakia). (Assignee).
S. Mackrle, and V. Mackrle.
U. S. Patent No. 3,959,144, 5 p, 6 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 946, No 4, p 1743, May 25, 1976.

Descriptors: *Patents, *Water purification, Water quality control, *Biological treatment, Chemical reactions, Flocculation, *Separation techniques, *Water treatment, Waste water treatment, Equipment.
Identifiers: *Chemical treatment, *Separation tanks.

A water purification plant composed of standard elements is arranged in such a way that all the spaces are formed for either chemical or biological water purification. The arrangement is composed of at least two tanks with substantially cylindrical mantles aligned side by side horizontally and with their axes parallel. Adjacent tanks, whose length is larger than their diameter, are mutually connected by inclined walls placed tangential to the mantles of the tanks. Inclined walls, adjacent upper parts of the mantles of the tanks and front and rear walls determine a separating space for the separation of the floccular suspension from the purified water. (Sinha - OEIS)
W76-12401

REVERSE OSMOSIS SYSTEM WITH AUTOMATIC FLUSHING,
Desalination Systems, Inc., Escondido, Calif. (Assignee).
For primary bibliographic entry see Field 5D.
W76-12402

TECHNIQUE FOR CONTINULUSLY ANALYZING THE CONCENTRATION OF OZONE DISSOLVED IN WATER,
Fischer and Porter Co., Warminster, Pa. (Assignee).
J. J. Morrow, and L. L. Dailey.
U.S. Patent No. 3,960,673, 4 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 947, No 1, p 294, June 1, 1976.

Descriptors: *Patents, *Water purification, *Water treatment, *Water pollution treatment, *Ozone, Disinfection, Oxidation, *Monitoring, Measurement, Instrumentation, Cathods, Anodes, Pollutant identification.

Ozone is extensively used in the purification of drinking water, the treatment of sewage and industrial wastes, as well as in various chemical manufacturing processes. To attain an effective germicidal action serving to destroy pathogens and all harmful bacteria and to react with oxidizable organic or inorganic chemical traces present in water, it is essential that the ozone concentration be in a predetermined range, such as 0.1 to 1 ppm. Below this range, the concentration is inadequate for its intended purpose. A technique is described for continuously indicating the concentration of ozone dissolved in water. Use is made of an amperometric cell, preferably formed of a gold cathode concentrically placed within a tubular copper anode to define an annular passage, the cathode being rotated at high speed. A sample stream of water is directed through the passage at a predetermined flow rate whereby in the absence of dissolved ozone, the cathode is polarized, but in the presence of it, depolarization takes place to cause a current to flow in the cell. The current is measured to provide a reliable and continuous reading of ozone concentration. (Sinha-OEIS)
W76-12405

WATER QUALITY OBJECTIVES.
Environmental Protection Service, Regina (Saskatchewan). Water Pollution Control Branch.
For primary bibliographic entry see Field 5G.
W76-12588

OPTIMAL TIMING AND SIZING OF A CONJUNCTIVE WATER SUPPLY AND WASTEWATER SYSTEM, USING NONLINEAR PROGRAMMING,
California Univ., Los Angeles.
M. E. Mulvihill.

Available from University Microfilms, Inc., Ann Arbor, Mich., 48106. Order No. 73-18641. Ph. D. Thesis, 1973, 134 p.

Descriptors: *Mathematical models, *Water supply, *Waste water treatment, Water reuse, Planning, Water quality, Algorithms, Linear programming, *Water treatment, Model studies, Optimization.

A mathematical model of a conjunctive urban water supply and waste water system, consisting of the minimization of a concave objective function subject to linear constraints, has been formulated and applied to the City of Los Angeles. The objectives are: to minimize the cost of supplying water from several sources, including the provision for recycling reclaimed water; and, to determine the capacity expansion schedule of the water and waste water treatment processes. A multi-level solution technique is developed to determine the minimum cost alternative for a selected planning horizon. The first level of the algorithm is an iterative process in which the objective function is successively linearized and a series of linear programs is solved. When this yields no improvement, the second level, a search of neighboring extreme points, is initiated. If there is an improvement at this level, the procedure returns to the first level and continues. The model and solution technique were successfully applied to an actual case and the results can be used as an aid in the comprehensive planning of the system. The mathematical model is flexible in that it can be expanded to include additional water quality constituents, advanced waste water treatment processes, and variations in water quality standards. (Sandoski-FIRL)
W76-12621

ALUM SLUDGE DRYING WITH BASIC EXTRACTIVE TREATMENT,
Resources Conservation Co., Renton, Wash.
For primary bibliographic entry see Field 5E.
W76-12641

5G. Water Quality Control

THE WINOOSKI WORKSHOPS: AN ASSESSMENT OF SPECIFIED WORKSHOP TECHNIQUES FOR STIMULATING AND IMPROVING PUBLIC INVOLVEMENT IN WATER RESOURCES,
Vermont Univ., Burlington. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W76-12151

THERMAL ANALYSIS OF FROZEN EMBANKMENT ISLANDS,
Puget Sound Naval Shipyard, Bremerton, Wash.
For primary bibliographic entry see Field 2L.
W76-12200

A LIMNOLOGICAL STUDY OF SPIRITWOOD LAKE, N. D., WITH SPECIAL EMPHASIS ON ITS WATER QUALITY, SEASONAL CYCLES OF CHEMICAL NUTRIENTS, PHYTOPLANKTON, ZOOPLANKTON AND PRIMARY PRODUCTION, PART I: PHOTOSYNTHETIC PRODUCTION AND ENERGY CONVERSION IN SPIRITWOOD LAKE, NORTH DAKOTA,
North Dakota State Univ., Fargo. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W76-12213

A LIMNOLOGICAL STUDY OF SPIRITWOOD LAKE, N. D., WITH SPECIAL EMPHASIS ON ITS WATER QUALITY, SEASONAL CYCLES OF CHEMICAL NUTRIENTS PHYTOPLANKTON, ZOOPLANKTON AND PRIMARY PRODUCTION, PART II: CAUSES AND CONTROL OF ALGAL BLOOMS IN SPIRITWOOD LAKE, NORTH DAKOTA,
North Dakota State Univ., Fargo. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W76-12214

ECONOMIC COSTS OF CONTROLLING WATER QUALITY THROUGH MANAGEMENT OF IRRIGATION RETURN FLOWS,
Washington State Univ., Pullman. Coll. of Agriculture.
G. H. Pfeiffer, and N. K. Whittlesey.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 517, $4.50 in paper copy, $3.00 in microfiche. Completion Report, August 1976. 58 p, 6 fig, 16 tab, 17 ref. OWRT B-059-WASH(2). 14-31-0001-5125.

Descriptors: Economics, *Water quality control, Irrigation, *Return flow, Nitrogen, Water temperature, Sediments, *Water management(Applied), Model studies, *Alternative costs, Water policy, Cost analysis, *Pollution abatement.

This study focuses on the economic and social costs of alternative policies that could be used to control water quality through management of irrigation return flows. Three environmental quality parameters associated with irrigated agriculture were singled out for analysis. These parameters were river water nitrogen concentration, river water temperature and loss of sediment from irrigated farms. A dual simulation and linear programming model was used as the vehicle of analysis. Policies considered for analysis included taxing water and nitrogen inputs, reducing water rights, and improved management techniques. Results indicated that improvement of water quality in the study area is possible through the control of agricultural inputs and activities. Improvement of the receiving water to a point suitable for most uses could reduce farm income 16 to 41 percent, depending on the policy employed. A trade-off existed between economic efficiency and distribution of abatement costs. Policies that relied on higher input prices for rationing tended to more efficiently allocate resources than policies that set arbitrary input use quotas. However, these more efficient policies having low total social costs also imposed higher costs on agriculture. The results indicate that considerable improvement in water quality is possible, perhaps 50 percent of that desired, at very little cost to agriculture or the public. Better management and more efficient irrigation methods could achieve this level of abatement very cheaply. Higher levels of abatement, however, become very expensive.
W76-12218

COASTAL ENGINEERING CONFERENCE. FOURTEENTH. PROCEEDINGS. COPENHAGEN, DENMARK, JUNE 24-28, 1974.
American Society of Civil Engineers, New York.
Coastal Engineering Conference. Fourteenth. Proceedings. held in Copenhagen, Denmark, June 24-28, 1974. 3 Volumes, 2580 p.

Descriptors: *Coasts, Engineering structures, Sediments, Sedimentation, Resources development, Water resources, Exploration, Exploitation, Environmental effects.
Identifiers: *Outer Continental Shelf, Environmental impact.

This collection of papers in three volumes constitute the proceedings of the 14th Coastal Engineering Conference held in Copenhagen, Denmark, June 24-28, 1974. The Conference was sponsored by Coastal Engineering Research Council and Waterways, Harbors, and Coastal Engineering Division, American Society of Civil Engineers; Ministry of public Works of Denmark; Danish Hydraulic Institute; Institute of Hydrodynamics and Hydraulic Engineering, Technical University of Denmark; and Danish Society of Civil Engineers. The papers are arranged by the following subject groupings: Theoretical and observed wave characteristics; Coastal sediment problems, Coastal Structures and related problems; and Coastal, estuarine and environmental problems. Pertinent papers are separately abstracted. (See W76-12222 and W76-12223) (Sinha-OEIS)
W76-12221

ENVIRONMENTAL ANALYSIS FOR BAHAMAS SUPERTANKER PORT,
Erindale College (Ontario).
W. Harrison.
In: Coastal Engineering Conference. Fourteenth. Proceedings, held in Copenhagen, Denmark, June 24-28, 1974, Vol III, Chap. 151, p 2551-2567, 1974. 9 fig, 11 ref.

Descriptors: *Environmental effects, *Oil spills, *Oil pollution, Water resources, *Resources development, Continental Shelf, Ports, Winds, Currents(Water), Aquatic drift, Atlantic Ocean, Water pollution sources.
Identifiers: *Outer Continental Shelf, *Superports, Supertankers, Wind effects, *Bahama Islands.

From the point of view of the Bahamian environment, the most favorable locations for a supertanker port are the western margin of the Great Bahama Bank; the western shores of Grand Bahama Island; and the western margin of Little Bahama Bank. A port in any of these areas would (1) usually be located down-wind and down-current of the majority of Bahamian islands and shallows, (2) be located adjacent to boundary currents, especially the Florida Current, that would tend to carry large accidental oil spills away from coastal areas and into the North Atlantic, and (3) be located where wave energies would be relatively low, and (4) be positioned close to sea-lanes, obviating supertanker penetration of the central Bahamas. A site 30 miles east of Freeport, Grand Bahama Island, was chosen for construction of a sea-island supertanker bunker. Six controlled spills (270 U.S. gals. each) of crude and two spills of naptha were made at the sea-island site during the windiest month (February). Slick spreading rates are presented. Cumene and all lower-boiling aromatics disappeared within the first 90 minutes after a crude-oil spill; a majority of toxic fractions (BP < 220 deg C) disappeared within 3 to 8 hours. Slick-drift roses for extreme-wind-persistence and strongest-coastal-current conditions indicate the environmental suitability of the site for capture and cleanup of small spills (< 1000 gal.). (See also W76-12221) (Sinha-OEIS)
W76-12222

ENVIRONMENTAL PROBLEMS ASSOCIATED WITH A PIPELINE LANDFALL IN COASTAL DUNES AT CRUDEN BAY, ABERDEENSHIRE, SCOTLAND,
Aberdeen Univ. (Scotland).
W. Ritchie.
In: Coastal Engineering Conference. Fourteenth. Proceedings, held in Copenhagen, Denmark, June 24-28, 1974, Vol III, Chap. 152, p 2568-2580, 1974.

Descriptors: *Environmental effects, *Pipelines, *Resources development, Water resources, *Oil industry, Continental Shelf, Coasts, Bays, Dunes, Beaches.
Identifiers: *Outer Continental Shelf, Environmental impact, North Sea, Scotland, Pipeline landfall.

The first oil pipeline from the North Sea area reached Scotland in 1973. The landfall, at Cruden Bay, Aberdeenshire, is a sediment-filled, bay-head beach with coastal dunes. Environmental and landscaping problems arose with the trenching of the beach and dune areas. Various methods, including flexible fence construction, spraying with

a bitumen compound and spreading of soil over vulnerable areas, protected the site successfully. Full revegetation took place later and the beach and dune area are now restored to their original condition. Environmental management techniques were designed to preserve the high amenity and ecological status of the site and minimise the risk of side-effects, both during and after engineering work. (See also W76-12221) (Sinha-OEIS)
W76-12223

OCEAN 72, IEEE INTERNATIONAL CONFERENCE ON ENGINEERING IN THE OCEAN.
Institute of Electrical and Electronics Engineers, Inc., New York.
Ocean 72, IEEE International Conference on Engineering in the Ocean, held Newport, Rhode Island, September 13-15, 1972. 613 p.

Descriptors: *Resources development, Water resources, *Water quality control, *Environmental effects, *Pollution, *Instrumentation, *Engineering, Continental Shelf, Tidal power, Biology, Remote sensing, Models, Acoustics, Data processing, Nuclear powerplants, Navigation, Optics, Underwater, Sediments, Materials, Exploration, Seismic properties.
Identifiers: *Outer Continental Shelf.

This collection of papers constitutes the proceedings of the conference on Engineering in the Ocean held at Newport, Rhode Island, September 13-15, 1972. Papers are grouped according to the following subjects: Signal Processing; Tidal Power; Marine Bio-Electronics; Project Sanguine; Electromagnetic Remote Sensing; System Modeling and Optimization; Underwater Acoustics; Magnetic and Electromagnetic Methods; Data Collection and Reduction; Pollution Measurements; Offshore Nuclear Generating Stations; Navigation, Positioning and Tracking; Instrumentation; Underwater Optics; Sediment Properties and Seismic Profiling; and Materials. (See W76-12225) (Sinha-OEIS)
W76-12224

ENVIRONMENTAL CONSIDERATIONS OF OFFSHORE GENERATING STATIONS,
Public Service Electric and Gas Co., Newark, N.J.
J. R. Roney.
In: Ocean 72, IEEE International Conference on Engineering in the Ocean, held Newport, Rhode Island, September 13-15, 1972. p 419-421, 2 ref.

Descriptors: *Offshore platforms, *Environmental effects, *Resources development, Water resources, *Nuclear powerplants, *Thermal pollution, Continental Shelf, Biota, Ecosystems, Breakwaters, Model studies, Radiation, Monitoring, Planning.
Identifiers: *Outer Continental Shelf, *Environmental impact, Artificial reefs.

The environmental considerations and the supporting program of studies for the offshore nuclear generating station is described and some of the anticipated environmental effects of the plant are discussed. A large amount of on-site investigation, laboratory experiments, and analysis is being carried out as a basis for an accurate prediction of the environmental impact. Physical models of the breakwater are being tested for wave effects. An on-site ecological survey is including sampling of the marine biota on an extensive scale. A prediction of the thermal effluent release pattern is being conducted by both computer model and physical modeling. An oceanographic survey is measuring currents, temperatures, etc. Measurement of the existing natural background of radiation will be conducted. No adverse effects on the environment are predicted from studies conducted so far. (See also W76-12224) (Sinha-OEIS)
W76-12225

SOME CAUSES OF ANOMALIES IN OXYGEN MASS TRANSFER IN POLLUTED WATER, (IN RUSSIAN),
Akademiya Nauk Latviiskoi SSR, Riga. Inst. of Wood Chemistry.
For primary bibliographic entry see Field 5D.
W76-12265

DETERMINATION OF THE CONDITIONS OF DISCHARGE OF SEWAGE INTO WATERS, (IN RUSSIAN),
Ministerstvo Zdravookhraneniya SSSR, Moscow. Institut Biofiziki.
V. M. Prusakov, and I. A. Voronova.
Gig Sant. 38(7), p 65-66, 1973.

Descriptors: *Water quality standards, Regulation, Waste disposal, *Sewage disposal, Lethal limit, *Toxicity, Water pollution control.
Identifiers: *Maximum allowable concentrations, *USSR.

The main document (USSR) on the basis of which the sanitation engineer determines the conditions of sewage discharge into waters is the Regulations for Preservation of Surface Waters. The list of maximum allowable concentrations contained should be supplemented by a list of threshold concentrations expressed in fractions of the maximum allowable concentrations. In the case of the simultaneous content of substances in sewage with the same or close concentrations, the limiting index of harmfulness for each substance is that which requires a maximum decrease of the maximum allowable concentration. The effect of summation of the threshold concentrations should be considered.--Copyright 1975, Biological Abstracts, Inc.
W76-12266

A STOCHASTIC MODEL FOR PREDICTING THE PROBABILITY DISTRIBUTION OF THE DISSOLVED-OXYGEN DEFICIT IN STREAMS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5B.
W76-12276

PROPOSED CROSS-FLORIDA BARGE CANAL: WATER-QUALITY ASPECTS, WITH A SECTION ON WASTE-ASSIMILATIVE CAPACITY,
Geological Survey, Tallahassee, Fla.
A. G. Lamonds, and M. L. Merritt.
Water-Resources Investigations No 76-23, February 1976. 189 p, 37 fig, 29 tab, 44 ref.

Descriptors: *Water pollution sources, *Canal construction, *Baseline studies, *Water quality, *Florida, Environmental effects, Surface waters, Groundwater, Aquifers, Seepage, Water table, Data collections, Evaluation.
Identifiers: *Cross-Florida barge canal.

This route of the partly completed Cross-Florida Barge Canal follows the St. Johns, Oklawaha and Withlacoochee Rivers. If the canal is completed, the Summit Reach, connecting the Oklawaha and Withlacoochee Rivers will be excavated into the Floridan aquifer. Large springs that discharge from this limestone and dolomite aquifer flow to the Oklawaha and Withlacoochee Rivers. These streams and the aquifers in much of the area contain a calcium bicarbonate water which has an average dissolved solids concentration of less than 300 mg/liter and generally is suitable for most uses. Dense groths of aquatic plants in Lake Ocklawaha and Lake Rousseau, existing impoundments for the Barge Canal, have caused large diel variations and stratification of dissolved oxygen. Problems of canal construction on the quality of water include increased turbidity and suspended sediment concentrations during dredging and land clearing operations. The impoundment of Eureka Pool in the Oklawaha River will probably result in increased aquatic plant production and large variations in dissolved oxygen concentrations similar to those in Lake Ocklawaha. In some parts of the canal, canal water will move into the aquifer, so the quality of ground water in those places will depend partly upon the quality of water in the canal. Seepage from the canal to the aquifer is expected to be larger in the Summit Reach than in any other reach. (Woodard-USGS)
W76-12283

THE EXTENT OF HAZARD AND THE HYGIENIC STANDARDIZATION OF ISOPHTHALONITRILE IN BODIES OF WATER, (IN RUSSIAN),
Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 5C.
W76-12286

DEVICE FOR AERATING WATER BODIES, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. of Hydromechanics.
V. M. Karasik, and I. I. Stovbun.
Gidrobiol Zh. 10(6), p 108-111, 1974.

Descriptors: *Aeration, Algae, *Cyanophyta, Design, Treatment facilities, Water pollution control, Pollution abatement, Design criteria, Operations.

A design for an aeration plant for water bodies is proposed and its zone of effective action established. The parameters and operating regime of the aeration plant needed for suppressing the activity of blue-green algae were determined. The plant is recommended for small water bodies (up to 50 ha) with a depth of 5 m.--Copyright 1975, Biological Abstracts, Inc.
W76-12311

A NEW STANDARD 'DRINKING WATER' (GOST 2874-73) AND ITS SCIENTIFIC BASIS, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).
S. N. Cherkinskii.
Gig Sanit. 6, p 7-11, 1974.

Descriptors: *Potable water, *Water quality standards, *Bacteria, *Coliforms, Organoleptic properties, Nitrates, Ions, Chlorides, Phosphates, Iron, Sulfates, Manganese, Aluminum, Arsenic, Lead, Toxicity.
Identifiers: Acrylamide, Beryllium, Fluorine, Molybdenum, Selenium, Silver, Strontium, *USSR.

The composition and properties of drinking water must meet certain standards concerning the degree of total bacterial contamination and content of coliform bacteria, harmlessness of the chemical composition and its favorable organoleptic properties. The previous standard specified permissible levels of only 3 toxic substances found in natural water (As 0.05 mg/l, Pb 0.1 mg/l and F 1.5 mg/l). Five additional substances are specified in the new standard (Be 0.0002 mg/l, Mo 0.5 mg/l, Se 0.001 mg/l, Sr 2 mg/l and nitrates (with respect to N) 10.0 mg/l), and flocculant polyacrylamide (2 mg/l) and Ag ions (0.05 mg/l) are specified for the 1st time. The new standard also specifies dry residue content of not more than 1000 mg/l, chlorides 300 mg/l, sulfates 500 mg/l, Fe 0.3 mg/l, Mn 0.1 mg/l, residual Al 0.5 mg/l and polyphosphates 3.5 mg/l.--Copyright 1975, Biological Abstracts, Inc.
W76-12317

PHOSPHORUS DEFICIENCY IN CATTLE FROM THE BRASILIA REGION OF BRAZIL, (IN PORTUGESE),
Departamento de Pesquisas e Exp., Brasilia (Brazil).
M. D. S. Dayrell, J. Doebereiner, and C. H. Tokarnia.

Pesqui Agro Pecu Bras Ser Vet. 8(6), p 105-114, 1973.

Descriptors: *Phosphorus, *Cattle, South America, *Grasses, Water pollution control.
Identifiers: Aristida-Sp, Brasilia, *Brazil, Hyparrhenia-Rufa, Melinis-Minutiflora.

Young male cattle were studied under range conditions in 4 'cerrado' areas of Brazilia (Sobradinho, Planaltina, Formosa and Luziania) for a period of 14-21 mo. Serum Pi values were determined at monthly intervals during this period. At the same time analyses of P in grass samples of Melinis minutiflora, Hyparhenia rufa and Aristida sp., were carried out, as well as soil analyses. The results of the serum Pi estimations from cattle in the areas of Sobradinho and Planaltina were in agreement with the herd histories, which indicated that the Sobradinho area was not deficient in P and that the Planaltina area was deficient in P. In the areas of Formosa and Luziania, the serum Pi levels were intermediate, and also in agreement with the herd histories, which indicate a moderate P deficiency. There was a significant correlation between the P values in the blood serum and the value of the 3 grass species with the exception of the area where there was the most severe P deficiency. There was a correlation between the P values of the soil and the yearly average serum Pi value of the cattle from all 4 areas. No correlation was found between rainfall and Pi levels in the blood serum in P deficient areas, but in the area where there is no P deficiency there was a close correlation between increased rainfall and increased Pi in the blood serum.--Copyright 1975, Biological Abstracts, Inc.
W76-12322

ROLE OF AGRICULTURE IN THE QUALITY OF THE NEW HAMPSHIRE ENVIRONMENT,
New Hampshire Univ., Durham. Inst. of Natural and Environmental Resources.
R. D. Harter.
Presented at Conference on Agricultural and Processing Wastes in the Eastern Region: A Perspective, Philadelphia, Pennsylvania, December 1-3, 1970, p. 78-83. 2 tab.

Descriptors: *Farm wastes, Oxidation lagoons, Waste treatment, *Agriculture, *Environment, *New Hampshire, *Cattle, *Waste disposal, Lagoons, Swine, Poultry, Water pollution control, Odor.

The majority of New Hampshire's land area is too hilly to support an economically viable agricultural operation. A large portion of the remaining area is too wet to farm. Fruit and vegetable farming has been of minor importance. But the steady increase in tourism is encouraging roadside vegetable stands. New Hampshire has a minor animal industry when compared to many states. Sheep are largely confined to the hillier less populated regions of the state. Hog production is scattered across the state, a few hogs to a farm. Poultry production is nearer populated areas and is often accompanied by odor problems. Cattle contribute appreciably to the agricultural waste problem. Waste produced by cattle is roughly equivalent to that produced by the entire human population of the state. Mass waste disposal systems are uneconomical because few dairy herds exceed 100 head, and the majority are less than 30 head. Although oxidation ponds are more acceptable than lagoons, the structure still has generally not been acceptable as a waste disposal method. The New Hampshire Cooperative Extension Service personnel are meeting with farmers and are educating them to the role they must undertake. This service has been the most important single factor in the control of pollution from agricultural sources. (Cameron-East Central)
W76-12337

EVALUATING A LOW-ENERGY, HIGH-VOLUME PUMP FOR ODOR REDUCTION FROM LIVESTOCK WASTE LAGOONS BY MIXING,
Oklahoma State University, Stillwater. Dept. of Agricultural Engineering.
C. E. Rice.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 777, $3.50 in paper copy, $3.00 in microfiche. Completion Report, (1976). 19 p, 7 fig, 1 tab, 2 ref. OWRR A-051-OKLA(1).

Descriptors: Lagoons, Odor, *Mixing, Gases, Reservoirs, Waste water treatment, Biochemical oxygen demand, *Farm wastes, Pumps, Livestock, Conductivity, Chemical oxygen demand, *Farm lagoons, Oxidation lagoons.
Identifiers: *Anaerobic lagoons, *Propeller pumps, *Odor reduction.

A low-energy, high-volume propeller pump was placed in a lagoon receiving manure material from a confined housing with pit collection swine production operation to evaluate its effectiveness in the reduction of offensive odors from the lagoon. The retention time in the pits was 26 days or greater. Another lagoon of the same size (0.405 hectare surface area by 2.2 m deep), subject to similar conditions, was close by and provided a comparison of a treated (lagoon with pump) system with an untreated (lagoon without pump) system. The lagoons were anaerobic, very turbid and had no dissolved oxygen. The pump could completely mix the lagoon liquid about every four hours and it was operated from July 17, 1975 through Jauary 6, 1976. COD, BOD5, DO, pH, temperature, conductivity and general observations were obtained on a weekly basis beginning two weeks before start-up of the pump and through May, 1976. The observed results for the treated and untreated systems followed the same pattern. This indicated that the pump was not having a significant effect on the lagoon. The major difference observed was that the boiling activity, caused by the release of accumulated gases from the lagoon to the atmosphere, of the treated lagoon was reduced significantly compared to the untreated lagoon.
W76-12344

LOW-COST DISPOSAL SYSTEMS FOR FEEDLOT RUNOFF,
Agricultural Research Service, Lincoln, Nebr.
N. P. Swanson, and C. L. Linderman.
Agricultural Engineering, Vol. 55, No. 11, p 20-21, November, 1974. 3 fig.

Descriptors: *Agricultural runoff, *Feed lots, Disposal, *Costs, Irrigation, *Waste disposal, *Farm wastes, Sprinkler irrigation, Percolation, Waste treatment.

Cattle feeders are required by law to control runoff from their feedlots. The most practical method for disposing of runoff is land disposal through irrigation. The feeder needs a low-cost disposal system that is fitted to a minimum land area. The Soil Conservation Service recommends a disposal area 1 1/2 to 2 times larger than the contributing feedlot, but the specific area needed for disposal to empty the holding pond at any one time should be no longer than the feedlot. The runoff may be disposed of by a gravity flow system or through sprinkler irrigation. Gravity disposal through gated pipe, hoses, or single point discharge may require land preparation, some form of pump, protection from freezing, and it may require more labor. Sprinkler distribution requires more power, may require a reuse pit due to the runoff caused by the distribution, and may cause excess wetting during the seedling stage or just before harvest, thus damaging crops. Care must be taken in selecting irrigation components and in scheduling field applications. The larger the system, the more consideration should be given to application and distribution efficiencies. The most important considerations for smaller systems are low investment and labor costs. With either type, care must be taken to avoid ponding and mosquito breeding. Also the area should be located to take advantage of prevailing winds to avoid odor build-up near residences. (Merryman-East Central)
W76-12346

LITTLE POLLUTION FROM THIS FEEDLOT.
Agricultural Research, Vol. 19, No. 6, p 10-11, December, 1970. 2 fig.

Descriptors: *Feed lots, *Nebraska, Analysis, Nitrates, Gases, Nitrification, Climates, *Farm wastes, Water pollution control.
Identifiers: Manure pack.

The results of an investigation concerning nitrate pollution of a shallow groundwater table, conducted on a flat cattle feedlot in Nebraska, are discussed. The 120-by-305 ft. lot was chosen for study because of such conditions as: stocking rate of 400 sq. ft. per animal; little manure removal; highly permeable soil; fluctuating high-water table; and little surface drainage. Observations and measurements indicated that the manure pack (nearly 1 ft. thick) and the soil and manure form a common interface that effectively bars water movement. Analysis of soil core samples showed that downward movement of nitrates and other forms of nitrogen in the soil is minor. Promotion by interface of aerobic conditions in the pack and anaerobic conditions below the interface leads to generation of nitrates by nitrification in the aerobic zone, while breakdown by denitrification occurs in the anaerobic zone. Biological activity in the two zones creates gaseous compounds such as ammonia, carbon dioxide, and amines, which are dispersed into the atmosphere. Seven wells were installed in and around the lot to obtain water samples and water table depth measurements. Water samples were taken periodically from wells next to the feedlot and analyzed. The estimates indicated that 20 to 40 percent of Nebraska cattle feeding operations are on flat, permeable soil. The measurements indicated that considerable amounts of solid wastes can be removed simply by decomposition on the lot. These field observations are supported by results of laboratory studies. (East Central)
W76-12350

KEEPING RUNOFF SAFE.
Agricultural Research, Vol. 21, No. 10, p. 8, April, 1973. 3 fig.

Descriptors: *Agricultural runoff, *Rainfall, *Feed lots, Groundwater, Infiltration, Solid wastes, *Farm wastes, Water pollution control, Pollution abatement.

Continuing research is showing how and when Great Plains cattle feedlots may contribute to water pollution and is demonstrating that, with adequate control of runoff, feedlots can be acceptable neighbors. In cooperation with the Nebraska Agricultural Experiment Station, studies are being made of how rainfall, snow, temperature, and evaporation affect pollution from sloping feedlots. These studies show that widespread contamination of ground water by infiltration from the feedlot surface is improbable. The research indicates that feedlots should be designed to restrict surface runoff, which may transport heavy loads of pollutants. The amount of solids transported in runoff may be less from a feedlot than from tilled bare soil. Snowmelt runoff may transport 10-12 times the amounts of solids removed in rainfall from the same feedlot, and the COD will thus be correspondingly higher. The potential pollution hazard from a particular feedlot can be determined only by study of the watershed of which it is a part--its hydrologic characteristics and its proximity to surface water sources. (Cameron-East Central)
W76-12351

MAINE GUIDELINES FOR MANURE AND MANURE SLUDGE DISPOSAL ON LAND.
Maine Univ., Orono. Cooperative Extension Service.
Miscellaneous Report 142, The Life Sciences and Agricultural Experiment Station and the Cooperative Extension Service, University of Maine, Orono, 1972, 21 p. 2 fig, 11 tab.

Descriptors: *Sludge disposal, *Maine, Nitrogen, Lagoons, Irrigation, Landfills, *Farm wastes, Waste disposal, *Water quality standards, Recycling, Dehydration.
Identifiers: *Land spreading, Composting.

This standard is concerned with conditions for: (1) total recycling of nutrients through planned crop production; (2) disposing of excess manure on the land by spreading; (3) piling on the land; (4) bulk burying in landfill; (5) composting; (6) lagoon treatment with sludge and liquid disposal; (7) disposal by irrigation; and (8) dehydrated manure disposal. Maximum rates for spreading manure on land and for other methods were developed from the physical and chemical characteristics of each individual soil, and from the available knowledge of the movement of manure liquids and residues on and through each soil type. The limiting factor in determining application rate is the pounds of nitrogen per acre to be applied. An extensive table is given summarizing the permissible disposal practices and maximum manure application rates for several Maine soils. (East Central)
W76-12353

RELATING AGRICULTURAL INSTRUCTION TO ENVIRONMENT IMPROVEMENT: THE ROLE OF LAND AND SOIL,
Arizona Univ., Tucson. Dept. of Agricultural Chemistry and Soils.
W. H. Fuller.
Journal Paper No. 1854, Arizona Agricultural Experiment Station, University of Arizona, 1971, p. 69-72. 4 fig, 1 ref.

Descriptors: *Soils, *Waste disposal, *Oceans, *Water pollution, *Soil contamination, Fertilizers, Soil conservation, Organic matter, Carbon dioxide, Bacteria, Nutrients, Municipal wastes, Nitrogen, Phosphorus, Sulfur, *Farm wastes, *Education, *Training.
Identifiers: *Agricultural instruction, *Land disposal.

For many years warnings have been issued that man's waste disposal problem should be controlled before it gets out of hand. In the past these warnings were ignored, but today many people are working to slow down the pollution of the environment. Pollution usually ends up in either the soil or ocean. Resistance to polluting the ocean has thrown most of the burden of waste disposal on the soil. Pollution can be controlled through the soil because it is an excellent digester of wastes. The soil decomposes organic matter. It produces nitrogen and sulfur through complex microbial cycles which are initiated by organic material, and the end product of most waste is carbon dioxide, water, and humus. What is needed is knowledge of how to use these wastes to benefit the soil, and this should begin in the colleges. Courses should be developed to make people aware of the problems and the solutions. (Russell-East Centrai)
W76-12354

ECONOMIC EVALUATION OF LIQUID MANURE DISPOSAL SYSTEMS FOR DAIRY CATTLE,
Economic Research Service, Madison, Wis. Farm Production Economics Div.
N. D. Kimball, L. V. Lenschow, and R. E. Rieck.
Bulletin R2199, College of Agricultural and Life Science, University of Wisconsin, Madison, August, 1970, 24 p. 8 fig, 5 tab.

Descriptors: *Liquid wastes, *Waste disposal systems, *Economics, *Costs, *Dairy industry, Waste storage, Equipment, Facilities, Labor, *Wisconsin, Water pollution control, *Farm wastes, Waste treatment.

Experiences are described of Wisconsin dairy farmers who installed liquid manure disposal systems. These liquid manure systems include: (1) free-stall, all liquid (2) free-stall, liquid-conventional, (3) stanchion, all-liquid, (4) stanchion liquid-conventional. Comparisons are made of liquid manure storage, facility, investments, annual costs, and costs and returns analysis. The most economical manure-handling system depends on many variables. The net disposal costs depend upon both the value of the manure and the cost of disposing the excrement. By changing the amount on nitrogen, phosphorus, and potassium recovered and making different assumptions regarding operating and ownership costs, the optimum system of manure disposal would change. In addition, installation costs are only the out-of-pocket costs--farmers did not report a charge for their own labor. Therefore, each farmer must ask himself whether the assumptions used in this study agree with his particular situation and then interpret the results accordingly. (Merryman-East Central)
W76-12357

BEEF FEEDLOTS - A POLLUTION PROBLEM,
Agricultural Research Service, Lincoln, Neb.
C. B. Gilbertson.
Proceedings of Agriculture and Pollution Seminar, University of Arizona, Tucson, February 19, 1971, EES Series Report No. 35, p. 18-29. 5 tab, 19 ref.

Descriptors: *Feed lots, *Management, *Water pollution sources, *Air pollution, *Waste disposal, Climates, Agricultural runoff, Chemical properties, *Farm wastes, Livestock, Water pollution control, Pollution abatement.

The waste produced by the livestock feeding industry creates a pollution problem for management. The management of feedlot is affected by physical characteristics of the feedlot, climatic conditions, animal size, animal density and the type of ration fed. Livestock wastes are potential pollutants of (1) surface water, (2) ground water, (3) air, and (4) aesthetic values. Each of these problems is discussed. The primary problem in feedlot management is the need for acceptable pollution-free waste management schemes to replace waste disposal systems. An acceptance of an available method rather than research-backed recommendations is the reason for existing waste management practices. (Kehl-East Central)
W76-12358

WATER QUALITY AND WASTE DISPOSAL IN MONTANA,
Montana State Univ., Bozeman. Dept. of Botany and Microbiology.
For primary bibliographic entry see Field 5C.
W76-12359

SOIL CONSERVATION SERVICE, TEXAS TECH UNIVERSITY WORKSHOP COMMITTEE ON FEEDLOT WASTE.
Soil Conservation Service, Temple, Tex.
Soil Conservation Service, Texas Tech University Workshop Committee on Feedlot Waste, Texas Tech University, Lubbock, July 28-29, 1971, 44 p. 9 fig, 6 tab, 7 ref.

Descriptors: *Farm wastes, *Feed lots, Water quality, Water pollution, Waste disposal, Design criteria, Pollution abatement, *Waste treatment, Water pollution control.

Presentations were made dealing with the state laws and procedures for protecting Texas waters from feedlot wastes. Factors that affected the feedlot wastes and the quantity and quality of such wastes were discussed. Waste disposal methods and designs for feedlot pollution abatement systems were examined. (See W76-12364 thru W76-12368) (Kehl-East Central)
W76-12363

FACTORS AFFECTING QUALITY AND QUANTITY OF FEEDLOT WASTE COLLECTIONS,
Texas Tech Univ., Lubbock. Water Resources Center.
For primary bibliographic entry see Field 5D.
W76-12364

SOIL CONSERVATION SERVICE STANDARD AND SPECIFICATIONS FOR POLLUTION ABATEMENT MEASURES FOR CONFINED LIVESTOCK OR POULTRY FEEDING OPERATIONS,
Soil Conservation Service, Temple, Tex.
E. L. Alexander.
In: Soil Conservation Service, Texas Tech University Workshop Committee on Feedlot Waste, Texas Tech University, Lubbock, July 28-29, 1971, 10 p. 1 tab.

Descriptors: *Pollution abatement, *Confinement pens, *Livestock, *Poultry, *Regulation, *Agricultural runoff, Design criteria, Water pollution, Basins, Lagoons, *Farm wastes, Waste disposal, *Water quality standards, Waste treatment.
Identifiers: Site selection, Pollution control, Holding ponds, Land disposal.

Guidance and criteria applicable to practices and facilities for the diversion of uncontaminated offsite drainage and for the interception, settling, collecting and disposing of contaminated runoff from livestock or poultry feeding areas are presented. Criteria for the selection of a site and for the design of the feeding operation are given. (See also W76-12363) (Kehl-East Central)
W76-12367

GUIDELINES FOR HANDLING LIQUID WASTE FROM FEEDLOTS,
Texas Water Quality Board, Austin.
D. L. Pittman.
In: Soil Conservation Service, Texas Tech University Workshop Committee on Feedlot Waste, Texas Tech University, Lubbock, July 28-29, 1971, 4 p.

Descriptors: *Feed lots, *Liquid wastes, *Agricultural runoff, *Waste water disposal, *Water quality standards, Waste treatment, *Farm wastes.
Identifiers: *Solid waste disposal, Waste Control Order for Cattle Feeding Operations, Holding ponds.

The procedure for obtaining a Waste Control Order for Cattle Feeding Operations from the Texas Water Quality Board is given. Application evaluation is primarily based on pollution control measures for the following: (1) collection and retention of feeding area runoff water, (2) disposal of accumulated waste water, (3) groundwater protection from holding pond waste water seepage, and (4) disposal of accumulated solid waste. The process of obtaining a waste control order generally takes 3 months or longer. (See also W76-12363) (Kehl-East Central)
W76-12368

OUTLOOKS FOR THE FUTURE OF DEEP WELL DISPOSAL,
SCS Engineers, Reston, Va.
For primary bibliographic entry see Field 5E.
W76-12370

BASIC REMOTE SENSING INVESTIGATIONS FOR BEACH RECONNAISSANCE: AN INTERIM REPORT,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 2L.
W76-12375

PREDICTED OIL SLICK MOVEMENT FROM VARIOUS LOCATIONS OFF THE NEW JERSEY-DELAWARE COASTLINE,
Coast Guard Research and Development Center, Groton, Conn.
For primary bibliographic entry see Field 5B.
W76-12376

SELF-MONITORING PROCEDURES: BASIC LABORATORY SKILLS (164.6) STUDENT REFERENCE MANUAL,
Charles County Community Coll., La Plata, Md.
For primary bibliographic entry see Field 5A.
W76-12377

AN IN-SITU INVESTIGATION OF OIL BARRIER SHAPE AND DRAG COEFFICIENTS,
Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
R. M. Larrabee, and G. A. Brown.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A017 099, $7.25 in paper copy, $3.00 in microfiche. U.S. Coast Guard Final Report No. USCG-D-161-75, July 1974. 201 p, 80 fig, 21 tab, 28 ref, 5 append. DOT-CG-33,962-A.

Descriptors: *Continental Shelf, *Oil pollution, *Oil spills, Resources development, *Water quality control, *Pollution abatement, *Barriers, Drag, Ocean currents, Waves(Water), *Rhode Island, Bays.
Identifiers: Outer Continental Shelf, Offshore technology, Wave action, Current action, *Oil barriers, *Narragansett Bay(RI).

In-situ experimentation on a moored 100 foot section of commercially procured oil barrier was carred out in the vicinity of the Jamestown Bridge in the West Passage of Narragansett Bay. The objectives were to study oil barrier shape and tensions as influenced by current and wave action, to analyze data on the barrier shape with existing analyses and to compare results of tension and drag coefficient data with previous investigations. Actual barrier shape was compared to a theoretical catenary drawn through the barrier end points. The shape, load, current and wave data were used to calculate various drag coefficients for the boom. Two techniques were used to calculate drag coefficients for the barrier and results of each were compared. The effects of wave action on barrier loading were determined by the analysis of two previous investigators and the results compared. Values of drag coefficient were reduced to a basic drag coefficient, independent of barrier shape configuration as well as wave effects. Results of the investigation showed that the catenary curve is a good approximation to barrier shape. The values of drag coefficients calculated indicate that a value of 1.5 to be a good approximation for the calm-water basic drag coefficient for the moored oil barrier. (Sinha-OEIS)
W76-12378

COMPARISON OF ECOLOGICAL IMPACTS OF POSTULATED OIL SPILLS AT SELECTED ALASKAN LOCATIONS. VOLUME I. INTRODUCTION, SUMMARY, METHODOLOGY, EVALUATION AND APPENDICES,
Mathematical Sciences Northwest, Inc. Bellevue, Wash.
For primary bibliographic entry see Field 5C.
W76-12379

HIGH SEAS OIL CONTAINMENT BARRIER MOORING SYSTEM,
Coast Guard Research and Development Center, Groton, Conn.
K. R. Bitting.
Available from the National Technical Information Service, Springfield VA 22161 as ADA 020 980, $5.00 in paper copy, $3.00 in microfiche. Final Report No. USCG-D-176-75, July 1975. 86 p, 14 fig, 3 tab, 4 append.

Descriptors: *Continental Shelf, *Oil pollution, *Oil spills, *Pollution abatement, Water quality control, *Barriers, Water resources, Resources development.
Identifiers: *Outer Continental Shelf, *Mooring systems, *Oil containment.

The mooring system was designed, fabricated and tested to moor the Air Deployable Lightweight High Seas Oil Containment Barrier, a component of the U. S. Coast Guard's High Seas Oil Spill Response System. The key criteria to which the mooring system was buit are: (1) deliverable by HH-3 helicopter, (2) holding capacity of 8,500 pounds with 1,000 pound nominal load, (3) capability of obtaining a mooring scope of 2:1 to 3:1 in water depths of 25 to 200 feet. The system consists of an inflatably buoy, 500-pound STATO anchor, 550 feet of 7/8 diameter polyurethane-jacketed nylon line and 45 feet of 3/4 inch chain, and a delivery container. Once the mooring system has been delivered to the site by the helicopter, a small boat tows it to the location and activates the system. The delivery container is recovered by a buoy tender once the system has been deployed. Computer methods were used to size the anchor and mooring line segments that are used to construct a mooring of desired length and scope. Anchor holding power and operational sequence tests were conducted. The system weighs 2,350 pounds and has a delivery radius of 70 nautical miles as external cargo under an HH-3 helicopter. (Sinha-OEIS)
W76-12384

FAST CURRENT OIL RESPONSE SYSTEMS, TESTS ON PHASE I CONCEPTS,
Michigan Univ., Ann Arbor. Dept. of Naval Architecture and Marine Engineering.
W. P. Graebel, and V. A. Phelps.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA 022 928, $9.75 in paper copy, $3.00 in microfiche. U. S. Coast Guard Final Report No. USCG-D-20-76, April 1975. 305 p, 219 fig, 7 tab, 5 append. DOT-CG-32430-A.

Descriptors: *Instrumentation, *Oil pollution, Water quality control, *Separation techniques, *Pollution abatement, *Data processing, Testing, Test facilities, *Water pollution control, Equipment.
Identifiers: Fast current oil response systems, *Oil recovery.

Seven different concepts for fast current oil response systems were tested at the University of Michigan Fast Current Recirculating Channel. The purpose of the tests was to perform an equivalent series of tests on each device under the same environment to enable competitive comparison of the devices. This evaluation was made both quantitatively through instrumentation, and qualitatively by observation of the tests. Testing was done by University of Michigan staff with a U. S. Coast Guard officer in attendance. The device was operated by the contractor. The test program matrix included three oil viscosities, four nominal slick thicknesses, and seven current speeds. A maximum of fifty-one tests were scheduled for each device, depending on device size and capacity. The seven concepts are ranked in the order of best performance. None of the seven devices tested are near to meeting the stated goals of the Coast Guard, although they do improve present current speed capabilities by a factor of three when compared to barriers. (Sinha-OEIS)
W76-12385

EVALUATION OF MEMBRANE OIL POLLUTION PREVENTION SYSTEM RESEARCH,
Daedalean Associates, Inc., Woodbine, Md. Springlake Research Center.
A. A. Hochrein Jr., J. D. Helm, and A. P. Thiruvengadam.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A018 945, $4.50 in paper copy, $3.00 in microfiche. U. S. Coast Guard Final Report No. USCG-D-175-75, August 1975. 67 p, 10 fig, 1 tab, 23 ref. DOT-CG-52,312-A.

Descriptors: *Oil pollution, Water resources, Water quality control, Pollution abatement, Oily water, *Membranes, Coasts, Transportation, Elastomers, Continental Shelf, Water pollution control, Waste water treatment.
Identifiers: Ballast tanks.

The research and engineering development effort on the membrane oil pollution prevention system (MOPPS) conducted for U. S. Coast Guard and U. S. Navy is reviewed and evaluated. Scale model tanks were used to define and evaluate problems associated with dynamic response of membrane configurations under simulated operating conditions. A commercially available neoprene-nylon-nitrile elastomer was found to be the best material for the membrane. Evaluation of the physical properties of a full scale thickness material indicates that the elastomer can withstand abrasion, oil immersion, creasing, wrinkling and pressure fluctuations. Preliminary results indicate little susceptibility to biodeterioration. However it is believed that further study on MOPPS is not warranted at the present time because of costs, operational complexity, and apparent industry acceptance of segregated clean ballast systems. (Sinha-OEIS)
W76-12388

ANALYSIS OF THE ROLE OF THE GULF INTRACOASTAL WATERWAY IN TEXAS,
Texas Engineering Experiment Station, College Station.
P. J. Shepard.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-247 373, $8.00 in paper copy, $3.00 in microfiche. Sea Grant Report No. TAMU-SG-75-202, December 1974. 246 p, numerous fig and tab, separate ref for each report. 04-3-158-18.

Descriptors: *Resources development, *Texas, Water resources, *Environmental effects, *Ecosystems, Water quality control, Dredging, Waste disposal, Coasts, Transportation, Engineering, Economics, Social impact, Legal aspects, Gulf of Mexico.
Identifiers: *Gulf Intracoastal Waterway(Tex).

Six tasks on various facets of the Gulf Intracoastal Waterway in Texas are reported. The reports describe the role of the Gulf Intracoastal Waterway as a transportation artery and the significance of this system to the economy of Texas. The task report provide baseline data on the Waterway on environmental implications, engineering aspects, sociological characteristics, economic impacts, funding alternatives, and legal considerations. A major thrust is an analysis of State sponsorship for maintenance and development of the Waterway. Funding alternatives are described for State sponsorship including estimated amortization and total costs for varying administrative and fiscal scenarios. Supplementing the approach is a thorough analysis of historical and existing laws bearing on State sponsorship. A dominant theme of the effort was to document the importance of the Waterway to the people and economy of Texas. This report includes findings and alternatives expressed by various researchers. (See also W76-12390) (Sinha - OEIS)
W76-12389

ENVIRONMENTAL IMPLICATIONS OF MAINTENANCE AND IMPROVEMENT OF THE GULF INTRACOASTAL WATERWAY IN TEXAS,
Texas A and M Univ., College Station. Coll. of Agriculture.
R. B. Ditton, and R. L. Schmied.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-247 373, $8.00 in paper copy, $3.00 in microfiche. In: Texas A and M University Sea Grant Report No. TAMU-SG-75-202, p 11-52, December 1974. 6 fig, 3 tab, 21 ref. 04-3-158-18.

Descriptors: Water resources, *Texas, *Dredging, *Environmental effects, *Water quality control, *Ecosystems, Ecology, Fisheries, Nutrient, Biota, Grasses, Waste disposal, Gulf of Mexico.
Identifiers: Environmental impact, *Gulf Intracoastal Waterway(Tex).

A cursory review is given of some of the environmental considerations and impacts involved in maintenance and development of the Gulf Intracoastal Waterway. While no new primary data sources were generated, a vast amount of published material was reviewed in drafting this statement. Following a conceptual review of the environmental sub-systems contingent with the path of the GIWW, impacts associated with the maintenance and development of the Waterway are discussed and alternative means of materials disposal are analyzed. (See also W76-12389) (Sinha-OEIS)
W76-12390

USE OF THE METHOD OF MATHEMATICAL DESIGN OF EXPERIMENT IN SANITARY-CHEMICAL INVESTIGATIONS OF EPOXY COATINGS, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
V. O. Sheftel', and V. A. Tsendrovskaya.
Gig Sanit. 10, p 66-68, 1974.

Descriptors: *Epoxy resins, *Protective coatings, *Pipes, Water temperature, *Regression analysis, *Water pollution control, Water pollution sources, Toxicity, Lethal limit, Organic compounds.

The effects of the 3 most essential factors on the intensity of migration of polyethylene-polyamine, diphenylol-propane and epichlorohydrin into water from epoxy coatings of water pipes, namely, time of contact of the material with water, temperature of the water and specific surface were studied. Analysis of the regression equations allowed recommendations on the development of nontoxic formulas of epoxy coatings and their use.--Copyright 1975, Biological Abstracts, Inc.
W76-12393

RESPONSE OF WATER-HYACINTH TO LASER RADIATION,
Oral Roberts Univ., Tulsa, Okla. Dept. of Natural Sciences.
For primary bibliographic entry see Field 4A.
W76-12406

COASLESCENCE FILTER FOR OIL-WATER DISPERSIONS,
Phillips Petroleum Co., Bartlesville, Okla. (Assignee).
C. R. Bresson.
U.S. Patent No. 3,960,719, 3 p, 1 fig, 1 tab, 6 ref; Official Gazette of the United States Patent Office, Vol 947, No 1, p 306, June 1, 1976.

Descriptors: *Patents, *Oil pollution, *Oily water, Water pollution treatment, *Water quality control, Filtration, *Coalescence, Polymers, *Separation techniques, *Dispersion, *Filters.
Identifiers: Ballast water.

A filtering media is provided for the removal of oil dispersed in a water phase such as ballast water in water tankers and bilge water from oil fired ships. A fabric made of an oleophilic, fiber-forming polymer having a high ratio of surface area to unit weight is used as the filtering medium through which is passed a mixture of oil droplets dispersed in a water phase thereby agglomerating the oil into sufficiently large drops that they will separate from the water phase to form a separate oil phase. Although a nonwoven fabric comprising a needled bat of carded fibers forms a basis for the experimental data, any method of producing a coherent fabric, such as weaving, should be suitable for the invention as long as the fabric produced has a high ratio of surface area to unit weight. The fabric will be used in multiple thicknesses in constructing a filter element. In a preferred embodiment a nonwoven fabric comprising a needled bat of carded polypropylene fibers fused on one side only and capcoated with an additional layer of polypropylene fibers needle punched into the unfused side was tested as a coalescing agent suitable for the invention. (Sinha-OEIS)
W76-12408

OIL ADSORBENT,
Idemitsu Kosan Kabushiki Kaisha (Japan). (Assignee).
M. Tomikawa, A. Tsunoda, K. Kaneda, H. Ohkawa, and Y. Mugino.
U.S. Patent No. 3,960,722, 4 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 947, No 1, p 307, June 1, 1976.

Descriptors: *Patents, *Oil pollution, *Oily water, *Water pollution treatment, *Water quality control, *Adsorption, Industrial wastes, Oil spills, Plastics.

An oil adsorbent is provided which is capable of effectively removing oil in water, has negligible water adsorbability and is easily disposable by incineration. A resin of polyethylene series is heated at a temperature near the softening point of the resin. An inorganic calcium compound is then added to the softened resin and the mixture is homogeneously mixed and the temperature is gradually elevated. The mixing operation is finished when the temperature of the mixture has reached 130-170C. The resultant milled mixture is then cooled, solidified and crushed to a solid granular material which is then charged into a conventional foam shaping extruder where the material is heated to a melt. The melt is extruded to form a foamy substance. The foamy substance in the form of a rope is shaped into a net by knitting or weaving or by adhesion. When the network product thus shaped is used as oil adsorbent, oils are not only adsorbed to the product but also kept in the interstices. (Sinha-OEIS)
W76-12409

REMOTE SENSING OF MARINE HYDROCARBON SEEPS,
Barringer Research Ltd., Rexdale (Ontario). (Assignee).
For primary bibliographic entry see Field 5A.
W76-12411

THE EFFECT OF METHODS OF OPERATION OF AERATION BASINS ON THE DEVELOPMENT AND POPULATION DENSITY OF CULEX PIPIENS L. IN THE SOUTH OF THE RUSSIAN SFSR, (IN RUSSIAN),
Rostov Research Inst. of Medical Parasitology (USSR).
L. Y. Il'chenko.
Med Parazitol Parazit Bolezn. 43(3), p 335-341, 1974.

Descriptors: Aeration, *Sewage lagoons, *Oxidation lagoons, *Mosquitoes, Insect control, *Aerated lagoons, *Insect control, Operations, Sewage treatment.
Identifiers: *Culex-pipiens, Russian-SFSR, USSR.

In the suburbs of Novocherkassk (USSR), sewage treatment basins are mass breeding places of C. pipiens. Improper operation leads to overloading with sewage and creates favorable conditions for mass breeding of these mosquitoes. Development of the water stages of C. pipiens depended mainly on the operating regimen of these aeration basins. Certain regimens completely prevent emergence of mosquitoes and permit control of C. pipiens by sanitary-hydrotechnical measures without insecticides.--Copyright 1975, Biological Abstracts, Inc.
W76-12419

COST OF WATER POLLUTION CONTROL IN THE CARPET INDUSTRY,
Exxon Research and Engineering Co., Florham Park, N.J. Water Pollution Control Section.
B. Black, L. D. James, and E. C. Tincher.
American Dyestuff Reporter, Vol 65, No 6, p 16, 18-19, 22, 61-62, June, 1976. 5 tab, 13 ref.

Descriptors: *Textiles, *Water pollution control, *Economic impact, *Legal aspects, Legislation, Costs, Federal Water Pollution Control Act, Industrial wastes, Waste water treatment, *Water quality standards.
Identifiers: Textile industry, Carpet and rug industry.

The economic impact of effluent guidelines required by the Federal Water Pollution Control Act of 1972 on the carpet and rug industry is examined. Under the Act, carpet mills that discharge pollutants directly to the environment must install the best practicable control technology currently available by 1977 and the best technology economically achievable by 1983. The typical investment for water pollution control equipment by 1983 is expected to be between $500,000 and $1 million for a mill. The cost of producing a square yard of carpet may increase by about 2.4 cents by 1977 and by 5 cents by 1983. These increases seem too small to affect sales on the basis of available data. (Kreager-FIRL)
W76-12422

GROUND-WATER AND SURFACE-WATER RELATIONSHIPS IN THE GLACIAL PROVINCE OF NORTHERN WISCONSIN - SNAKE LAKE,
Adolph Coors Co., Golden, Colo.
N. G. Jaquet.
Ground Water, Vol. 14, No. 4, p 194-199, July-August 1976. 7 fig, 7 ref.

Descriptors: *Surface-groundwater relationships, *Wisconsin, Central U.S., *Glacial aquifers, *Subsurface flow, * Lakes, *Tracking techniques, *Eutrophication, Groundwater, Groundwater movement, Percolation, Sediments, Seepage, Lake beds, Seasonal, Limnology, Flow system, Lake stages, Unsteady flow.
Identifiers: *Lake flushing rates, *Lake rejuvenation, Northern Wisconsin, *Snake Lake(Wis), Seasonal water level fluctuations, Tracer studies.

Lake rejuvenation efforts in the Upper Midwest are important to the area's economic dependence on high-quality lakes for tourism. In developing eutrophication studies for lakes in this area, it is essential to determine the thickness of aquifer communicating with the lake, as a preliminary to calculation of the lake flushing rate. The thickness of communicating aquifer is particularly critical for lakes fed primarily by ground-water recharge, e.g., Snake Lake, Wisconsin. Through use of observation wells and chloride tracer analysis, effective aquifer thickness at Snake Lake was determined to be 30 to 50 feet. However, the local flow systems were additionally found to be highly variable through the progression of seasions. It was recommended that the possible effect of such dynamic seasonal fluctuations on the local flow

system be considered in eutrophication studies to avoid possible improper siting of underground chemical and/or petroleum storage facilities and septic tanks in glacial deposit environments. (Prickett-ISWS)
W76-12444

WATER POLLUTION CONTROL IN THE SCANDINAVIAN COUNTRIES,
National Water Board of Finland, Helsinki.
For primary bibliographic entry see Field 5D.
W76-12473

POLLUTION CONTROLS -- CONSULTANT'S ROLE,
Mason (H. C.) and Associates, Inc., Gladstone, Oreg.
H. Edel.
In: Proceedings on Wood Residue as an Energy Source, September 3-5, 1975, Denver, Colorado, Forest Products Research Society, Madison, Wisconsin, p 114-115.

Descriptors: *Pollution abatement, Water pollution control, Air pollution, Solid wastes, Legislation, Profit, Economic impact, Safety, Wastes, Industrial wastes, Water pollution sources.
Identifiers: *Forest products industry, Noise pollution.

An increasing number of pollution control problems, such as boiler emissions, water pollution, solid wastes, noise levels, etc., from forest industry production facilities are being dealt with by consulting firms. All of these control problems have had major consequences to the forest products industry since the enactment of many federal, state, and regional pollution and safety regulations. Economic consequences of meeting strict pollution regulations were given little thought initially by legislators. The pollution control problems that require help from a consultant, however, are usually the more subtle aspects for meeting the detailed requirements of particular regulations. The primary role of a consultant is to increase productivity and profits while meeting established pollution regulations. (Witt-IPC)
W76-12478

IMPLEMENTATION OF A LARGE SCALE WATER QUALITY DATA MANAGEMENT SYSTEM,
Carnegie-Mellon Univ., Pittsburgh, Pa.
W. D. Haseman, C. Holsapple, and A. B. Whinston.
Reprint No. 601. Reprint series of the Institute for Research in the Behavioral, Economic, and Management Sciences, Krannert Graduate School of Industrial Administration, Purdue University, West Lafayette, Indiana. 7 p, 4 fig, 17 ref.

Descriptors: *Water quality, *Management, *Data storage and retrieval, *Data collections, *Water pollution control, Planning, Computers, Computer programs, Behavior, Networks, Monitoring, Systems analysis.
Identifiers: *Data bases, Query language.

The development of a computer-based information system for a state Stream Pollution Control Board is examined. It is concerned with the application of the Generalized Planning System (GPLAN) to a large scale water pollution problem. This planning system, which includes both a database and a collection of application programs, has been passing through a series of modifications and extensions to make it more adaptive to its environment. Although much theoretical work has gone into the GPLAN system design, the key to its acceptance will indeed be determined by those changes, as discussed in this paper, which have been a direct result of actual implementation and use in a real life situation. (Bell-Cornell)
W76-12521

POLLUTIONAL ANALYSIS OF COMBINED SEWER SYSTEMS,
Norsk Institutt for Vannforskning, Blindern.
For primary bibliographic entry see Field 5D.
W76-12530

WATER QUALITY LAW IN FEDERAL REPUBLIC OF GERMANY,
Bonn Univ. (West Germany). Inst. fuer das Recht der Wasserwirtschft.
K. Seifert, and T. C. Lyons.
Journal of the Water Resources Planning and Management Division, Proceedings of the American Society of Civil Engineers, Vol. 102, No. WR1, p 23-33, April 1976. 1 fig, 1 tab, 10 ref.

Descriptors: Water resources, *Water law, *Water quality, *Legislation, Water pollution, Europe, *Water pollution control, Water rights, History.
Identifiers: *West Germany.

The Federal Republic of Germany (FRG) is one of the most industrialized countries in the world today with a Gross National Product exceeded only by two other nations (USA and Japan). This industrial base, as well as a population of 62,000,000, is crowded into an area of 248,000 sq km, which is about the size of the State of Oregon. Attendant with this intensive development have been the same water quality problems that plague all heavily industrialized nations. Like other countries with these environmental problems, the FRG has developed a body of laws and administrative procedures that are intended to expedite the nation's effort in environmental enhancement. This paper traces the historical development of legislation and administrative procedures in water quality law and their practicability. The paper concludes with proposals on both changes in the laws and in the methods with which water quality legislation could be implemented and administered in the FRG. (Bell-Cornell)
W76-12531

A STUDY OF RESEARCH AND DEVELOPMENT IN ENVIRONMENTAL ENGINEERING USING SYSTEM APPROACH,
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
For primary bibliographic entry see Field 6B.
W76-12533

TECHNIQUES OF SIMULATION FOR HYDROLOGIC COMPUTATION, IN QUANTITY AND QUALITY, OF INTEGRATED WATER RESOURCES DEVELOPMENTS,
Office de la Recherche Scientifique et Technique Outre-Mer, Paris (France). Dept. of Fundamental Research Bureau.
For primary bibliographic entry see Field 6A.
W76-12539

APPLICATION OF MATHEMATICAL MODELLING TO WATER QUALITY FORMATION PROCESSES FOR OPERATIVE MANAGEMENT OF COMPLEX WATER RESOURCES SYSTEMS,
Vsesoyuznyi Nauchno-Issledovtelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
V. R. Lozansky, E. V. Eremenko, and V. P. Belogurov.
The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., 1974, Vol. II, p 49-52. 7 ref.

Descriptors: *Water quality, *Mathematical models, *Management, *Operations research, Water resources, Computers, Hydrodynamics, Equations, Rivers.
Identifiers: *Formation processes.

At present, water quality formation processes may be mathematically modeled in various ways. The choice of model depends on the volume of the required information, as well as upon the volume of the available initial information and on the required precision of the information obtained. Employment of any modern mathematical model demands the application of computers and their limitations and may also influence the choice of an applicable model. Herein, a river with a system of water-protecting construction is investigated; considerable involvement and space distribution are the usual characteristics, as well as a large number of natural and man-made factors influencing the processes of the river water quality formation, a multitude of uncontrollable disturbances, the limited possibilities of operative effects, and a large number of interacting regulators. Considered are two principally different approaches to model construction: the analytical and the synthetic. For operative control in complex systems of water resources it is possible to apply mathematical models constructed on the basis of both methods. A model for each specific case should be chosen according to the peculiarities of the subject, the required information, and the computer capacity. (See also W76-12535) (Bell-Cornell)
W76-12547

EXPERIENCES WITH MATHEMATICAL MODELS USED FOR WATER QUALITY AND QUANTITY PROBLEMS,
Rijkswaterstaat, The Hague(Netherlands), Data Processing Div.
For primary bibliographic entry see Field 6A.
W76-12548

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY'S STORM WATER MANAGEMENT MODEL,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
H. G. Torno.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., April, 1974, Vol. II, p 88-91.

Descriptors: *Environmental engineering, *Water pollution control, *Storm water, *Management, *Mathematical models, Urban runoff, Simulation analysis, Computers, Systems analysis.
Identifiers: *Storm Water Management Model.

Recent investigations have revealed that storm water discharges and combined sewer overflows are major sources of urban water pollution. It is obvious that construction of separate storm and sanitary sewers is not the solution, and it is equally infeasible to construct treatment plants capable of treating the peak flows generated in a combined system. The development of the digital computer has made complex mathematical models widely available to the engineer, and such an approach is ideally suited to the examination of storm and combined sewer overflow pollution abatement alternatives. The EPA's Storm Water Management Model (SWMM) is a comprehensive model of urban hydrological phenomena. It uses the rainfall and system characteristics as inputs, determines quantity and quality of runoff, routes this runoff through a combined sewer system with specified storage and treatment facilities and operating policies and thence into receiving waters, where their impacts are identified. This article describes the model, lists its applications, and discusses needed modifications for its future development and application to assist in the design of pollution control facilities. (See also W76-12535) (Bell-Cornell)
W76-12549

THE APPLICATION OF MATHEMATICAL MODELS AND OPTIMIZATION TECHNIQUES IN PLANNING WATER SUPPLY AND WASTE WATER DISPOSAL SYSTEMS,
Michigan Univ., Ann Arbor. Dept. of Environmental and Industrial Health.
For primary bibliographic entry see Field 6A.
W76-12560

ELABORATION AND USE OF A MATHEMATICAL MODEL TO FORECAST IN QUANTITY AND QUALITY, THE WATER DEMANDS OF VARIOUS SECTORS OF INDUSTRY,
Societe du Canal de Provence et d'Amenagement de la Region Provencale Le Tholonet, Aix-en-Provence (France).
For primary bibliographic entry see Field 6D.
W76-12562

BENEFIT COST ANALYSIS--A NECESSARY PART OF ENVIRONMENTAL DECISIONING,
Minnesota Univ., Duluth. Dept. of Economics.
For primary bibliographic entry see Field 6G.
W76-12576

ANOTHER VIEW OF OFFSHORE OIL AND GAS OPERATIONS.
Marine Technology Society Journal Vol 8, No 9, p 2-12, October/November 1974. 34 ref.

Descriptors: *Environmental effects, *Resources development, *Water quality control, Water resources, Continental Shelf, Oil, Gases, Assessment, Leases, Ecology, Drilling.
Identifiers: *Outer Continental Shelf, *Offshore technology, *Environmental impact, *Offshore drilling.

The report 'OCS Oil and Gas - an Environmental Assessment,' was examined by a committee of the National Academy of Sciences. Excerpts from the committee's findings about the CEQ report and the issues, both technical and of public policy are presented. While the Council on Environmental Quality (CEQ) Report is a responsive advisory statement on future environmental policies regarding OCS oil and gas, the committee wishes to stress the study's limited mandate as well as its understandable avoidance of consideration of alternatives to our current national energy policy. The report accepts OCS development as an exclusive activity of the private sector without examining various legislative proposals for a federal oil development corporation or for other public development entities such as exist in other countries that produce oil and gas. Finally, the report relies on the precept that continued annual growth in energy availability to the year 2000 and beyond is accepted public policy. The committee believes that these assumptions should be challenged by all concerned with the development of a viable, long-term national energy policy. The committee recommends that a vigorous effort be initiated to expand knowledge of the physical and biological environments and the ecological systems likely to be affected. Ecological studies of an area that might be affected by OCS development should be conducted while plans are developing for exploration and engineering, so that the possible effects can be evaluated before significant impacts occur. (Sinha - OEIS)
W76-12577

ONE APPROACH TO THE SUPERPORT/REFINERY QUESTION,
Texas Coastal and Marine Council, Galveston.
J. C. Moseley, and J. Frucht.
Marine Technology Society Journal, Vol 8, No 8, p3-9, September 1974.

Descriptors: *Continental Shelf, *Resources development, *Oil industry, Water resources, *Oil pollution, *Water quality control, *Environments, Effects, Management, Planning, Ports, Coasts, New England, New Hampshire.
Identifiers: *Outer Continental Shelf, *Superports, Refineries, Deepwater ports, Environmental impact.

A brief discussion is presented on the controversial issues on the construction of deepwater ports (superports) and the required oil refineries. It was presented before a New England conference on the subject held at the University of New Hampshire. The authors make the following suggestions: Realize that a large deepwater port and/or refinery complex is a permanent irreversible commitment; Learn something about the oil business--something other than Exxon ads and Common Cause press releases; Realize the difference between evolutionary and revolutionary actions/impacts in the context of DWPs and refineries; Realize that even in Texas, the oil and chemical industry doesn't own all politicians; Realize that credibility is usually proportional to size; Realize the magniture of the stakes involved; Consider a DWP/refinery and Outer Continental Shelf oil and gas development as related issues; Do not believe the promises and/or threats of promoters and hysteria peddlers; Do not act hastily nor finally with either closed or open arms; Do not naively believe that things can be completely controlled once development starts, and Do not become confused by lawyers (or engineers, or planners, or ecologists, or etc.) debating the finer points of facility siting/regulatory legislation and lose sight of the major public policy issues. On the issue of deepwater ports and refineries the private citizen's responsibilities include: seeing that all the appropriate issues are raised and revealing questions asked, pressing elected/appointed officials to thoroughly pursue the matter, and insisting on full and accurate disclosure by all included parties. (Sinha - OEIS)
W76-12578

DEVELOPMENT OF RESIDUALS MANAGEMENT STRATEGIES,
Indiana Univ., Bloomington. School of Public and Environmental Affairs.
C. N. Ehler, R. S. Howe, and N. White.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-251 012, $5.00 in paper copy, $3.00 in microfiche. Environmental Protection Agency, Report EPA-600/1-76-01/B, January 1976. 82 p, 6 fig, 5 tab, 3 append. R-803313-01-1.

Descriptors: *Waste disposal, *Decision making, *Planning, *Non-structural alternatives, *Water management(Applied), Pollution abatement, Water quality, Alternative planning, Institutions, Environment.
Identifiers: *Residuals, Residuals generation and discharge model, Residuals management strategies, Implementation, Physical methods.

Based on the premise that human activity generates and discharges waste residuals, a residuals generation and discharge model is proposed to achieve governmental standards of environmental quality. The residuals management model identifies various points in the residuals generation and discharge process where intervention with physical methods can reduce or alleviate the effect of residual wastes on the environment The physical methods are supplemented by implementation measures (non-structural actions such as laws, regulations and ordinances) and institutional arrangements (public organizations which establish goals and objectives, select and enforce physical methods, and adopt implementation measures) to form a residuals management strategy. Recommendations are: (1) use residuals generation and discharge model in the planning process; (2) the planning process for reviewing alternative residuals management strategies should start without considering legal, political, technological or social constraints; (3) all reasonable alternatives should be considered by decision makers; (4) the residuals generation and discharge model could serve as a common base for consumers, labor, business and government groups concerned with planning for environmental quality. (Gentry-North Carolina)
W76-12581

A METHODOLOGY TO MEASURE THE PERFORMANCE OF THE EPA REGIONAL EIS REVIEW PROCESS,
Argonne National Lab., Ill. Energy and Environmental Studies Div.
For primary bibliographic entry see Field 6G.
W76-12583

REPORT OF THE QU'APPELLE BASIN STUDY BOARD.
Saskatchewan Quappelle Basin Study Board, Regina.
October 1972. 92 p, 50 fig, 17 tab, 3 plates, 34 ref.

Descriptors: *Water quality, Water management, *Land use, Water resources, *Watershed protection, *Water supply, *Flood protection, *Canada, Algae, Planning, Agriculture, Institutions, Waste water treatment, Water use, River basins, *Saskatchewan.
Identifiers: *Qu'Appelle River Basin, Moose Jaw(Saskatchewan), Regina(Saskatchewan), Buffalo Pound Lake(Saskatchewan).

A comprehensive framework plan to develop and manage the water and related land resource of the Qu'Appelle Basin for social betterment and economic growth is presented. It was prepared by collecting basic data, determining planning objectives, analysing and evaluating alternatives, and finally, preparing the plan. The basin, which is a flat or gently undulating treeless plain, contains 20,000 square miles and is cut by the Qu'Appelle River Valley through its entire length to a depth of 100 to 300 feet. Population, currently at 280,000, will reach 320,000 by the year 2000. Continued urbanization in the basin is expected. Problems include algae blooms, flooding in urban areas, poor public access to lake shores in places, and possible water supple difficulities in the future. The plan contributes to a number of objectives: water supply and quality; industrial development public health; flood protection; recreation; wildlife; etc. Recommendations are presented in 5 categories; water quality; water supply; land and water surface use; adjustment to flood hazard; and general. Some recommendations for water quality are: specific objectives for water quality should be established; higher levels of treatment should be provided in Regina and Moose Jaw; agricultural practices in the basin should be controlled; regulations for waste disposal should be implemented; and water quality should be monitored. Recommendations with similar scope are given in the other areas. Recommendations on public participation, institutions, education, construction standards, and ownership are discussed in the general category. (Smith - North Carolina)
W76-12587

WATER QUALITY OBJECTIVES.
Environmental Protection Service, Regina (Saskatchewan). Water Pollution Control Branch.
January 1975. 16 p, 6 tab, append.

Descriptors: *Water quality, *Water quality standards, *Pollution, Water resources, *Water management, *Saskatchewan, Surface waters, Groundwater, Algae, Municipal water, Sewage treatment.
Identifiers: *Water quality objectives, Private water supply.

This listing of specific objectives pertains mainly to surface water, but deals to a small degree with ground water resources. The management objective of this agency is to conserve and protect water resource and to maintain and improve its quality for public protection, within economic limits. This serves the following purposes: protection of water supplies; encouragement of economic development; preservation of wildlife. The guidelines and objectives ennumerated here are not meant to be rigid, but serve as guides. Each case of waste disposal and water pollution is looked at on its own merits while considering a broader water quality

management point of view. The general objectives for effluent discharges are that such discharges should be: free from toxic or potential toxic substances; free from substances that will form objectionable sludge; free from debris, oil, etc. that would be noticeable in receiving waters; free from color, turbidity, or odour-producing materials that would have certain effects; and free from nutrient that would create nuisance growths. Specific objectives are given for: surface water, algae and acquatic nuisances, municipal drinking water, ground water quality, guidelines for private water supplies, and guidelines for sewage treatment. Objectives are given both as numbers and more general statements. An appendix explains 43 separate parameters used to measure water quality. (Smith - North Carolina)
W76-12588

USE OF EMERGENCE DATA FOR ESTIMATING ANNUAL PRODUCTION OF AQUATIC INSECTS,
Oregon State Univ., Corvallis. Dept. of Entomology.
For primary bibliographic entry see Field 2I.
W76-12597

A SURVEY OF PHOSPHORUS REMOVAL IN WISCONSIN,
Howard, Needles, Tammen and Bergendoff, Milwaukee, Wis.
For primary bibliographic entry see Field 5D.
W76-12649

U.S. ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT COMMAND ENVIRONMENTAL POLLUTION ABATEMENT PROGRAM,
For primary bibliographic entry see Field 5D.
W76-12651

WASTEWATER RESOURCES IN NORTH CENTRAL TEXAS,
Camp, Dresser and McKee, Inc., Boston, Mass.
D. R. Horsefield, and J. D. Goff.
American Water Works Association Journal, Vol. 68, No. 7, p 357-359, July, 1976.

Descriptors: *Water reuse, *Reclamation, *Reclaimed water, *Municipal wastes, *Cooling water, *Electric power industry, Treatment facilities, Water requirements, *Texas, Symbiosis.

The feasibility and desirability of waste water reclamation in North Central Texas are discussed. A review of various water reuse alternatives for the area indicates that the steam electric power industry is a potentially large user of reclaimed waste water. Cooling water requirements for the 11 major power plants in North Central Texas amount to an estimated 56 million gallons/day based on the present utilization of cooling towers and lakes, and water requirements are expected to more than double within the next 10 years. By the year 2000, water requirements based on existing cooling technology are expected to be a major problem for the power industry. Thus, the locating of new power plants near municipal waste water facilities so that high quality effluent can be used for cooling towers is recommended. (Kreager-FIRL)
W76-12652

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

OPTIMIZATION OF REAL TIME DAILY OPERATION OF A MULTIPLE RESERVOIR SYSTEM,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 4A.
W76-12155

PLANNING THE LOCATION AND CAPACITY OF FLOOD CONTROL STRUCTURES,
Cornell Univ., Ithaca, N. Y. Coll. of Engineering.
For primary bibliographic entry see Field 4A.
W76-12156

WABASH RIVER SYSTEMS MODEL - TERMINAL REPORT PHASE I,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-12220

AVAILABILITY OF GROUND WATER NEAR CARMEL, HAMILTON AND MARION COUNTIES, INDIANA,
Geological Survey, Indianapolis, Ind.
D. C. Gillies.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 224, $4.00 in paper copy, $3.00 in microfiche. Water-Resources Investigations 76-46, May 1976. 27 p, 10 fig, 2 tab, 7 ref.

Descriptors: *Groundwater resources, *Projections, *Water supply, *Aquifer characteristics, *Hydrogeology, Data collections, Test wells, Water yield, Regression analysis, Computer models, Transmissivity, Storage coefficient, Groundwater recharge, Pumping, Seepage, Water levels, Observation wells, *Indiana.
Identifiers: Carmel area(Ind).

A study of the hydraulic characteristics of the unconsolidated glacial deposits near the city of Carmel in central Indiana shows that 21.3 million gallons per day (mgd) of additional water could be withdrawn from the aquifer for an indefinite period of time. This pumpage is approximately 5 mgd above the projected water needs of Carmel for 1990. Saturated thickness, transmissivity, and storage coefficient of the outwash aquifer along the White River east of Carmel were determined, using available data supplemented by test drilling. The saturated thickness of the aquifer ranges from 10 to 110 feet; transmissivity ranges from 1,000 to 24,000 feet squared per day; and the average storage coefficient is 0.11. Seepage from the aquifer into the White River was estimated in November 1974, using data from U.S. Geological Survey gaging stations. Water-level information was obtained from a network of observation wells at that same time. A digital-computer model was used to estimate the rate of withdrawal that might be sustained from the aquifer and the effect of that withdrawal. The predicted average reduction of the flow of the White River is 21.3 mgd in the study area. To develop the fullest potential of the aquifer and to maintain reasonable pumping rates, pumping wells should be located as near to the river as possible and where the aquifer saturated thickness equals or exceeds 50 feet. (Woodard-USGS)
W76-12287

ECONOMIC UNCERTAINTIES IN WATER RESOURCES PROJECT DESIGN,
Eotovs Lorand Univ., Budapest(Hungary).
F. Szidarovszky, I. Bogardi, L. Duckstein, and D. Davis.
Water Resources Research, Vol. 12, No. 4, p 573-580, August 1976. 3 fig, 4 tab, 21 ref, 1 append.

Descriptors: *Water resources, *Projects, *Design, *Economics, Decision making, Equations, Simulation analysis, Monte Carlo methods, Methodology, Systems analysis, Hydrologic aspects, Flood protection, Levees, Construction costs, Benefits, Height, Optimization, Mathematical models, *Risks.
Identifiers: *Economic uncertainty programming, Benefit maximization, Flood losses, Sensitivity, Error correlation.

Economic uncertainty programing (Ecup) is a method which enables decision makers to analyze economic uncertainties separately from hydrologic uncertainties in the design of water resources systems. Ecup distinguishes between economic and hydrologic variables in the expression of a payoff or objective function. The economic variables, assumed to have been estimated at discrete points only, are treated as random variables. A postulated joint probability distribution of these variables is used to estimate by Monte Carlo simulation the distribution of payoff resulting from a project. The worth of perfect information or expected opportunity loss is calculated. In a case study, the problem of choosing among flood protection levees of different heights is examined. The random economic factors considered are the flood losses and construction costs. The sensitivity to various degrees of error correlation and loss uncertainty is analyzed. It is found that a relatively small uncertainty in the economic estimates of the payoff function may cause considerable variance in both the distribution of benefits to be expected from a levee and the height of the optimal levee. (Bell-Cornell)
W76-12514

INTERDISCIPLINARY MODELS OF WATER SYSTEMS,
Central and Southern Florida Flood Control District, West Palm Beach.
A. N. Shahane.
Ecological Modelling (International Journal on Ecological Modelling and Engineering and Systems Ecology) Vol. 2, No. 2, p 117-145, June 1976. 3 fig, 36 ref.

Descriptors: Water resources, *Ecology, *Mathematical models, Economics, Political aspects, Social aspects, Technology, Environment, Water quality, Methodology, Hydraulics, Hydrology, Optimization, Simulation analysis, Equations, Systems analysis, *Model studies.
Identifiers: *Interdisciplinary models, Water systems, Time series.

To evaluate the complex interactions of various types of water systems, a water resource management agency is invariably involved in the preliminary step of reviewing the available quantitative methods for formulating interdisciplinary aspects of the water systems. With a view to supplement their efforts, an attempt is made herein to review briefly the major useful concepts and models which are intended to broaden the technical horizon of the professionals associated with the regional water resource management programs. Initially, various pathways of model building procedure are outlined. Then associated ecological, economic, social, political, technological and environmental models are discussed in light of some reported quantitative examples. With the understanding of the basic mechanics of these interdisciplinary models, the adequacy of these models and their applications can be examined by the concerned professionals to aid the decision making process for the specific water system in question. (Bell-Cornell)
W76-12516

A DYNAMIC REGIONAL MODEL FOR EVALUATING RESOURCE DEVELOPMENT PROGRAMS,
Manitoba Univ., Winnipeg. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4A.
W76-12520

IMPLEMENTATION OF A LARGE SCALE WATER QUALITY DATA MANAGEMENT SYSTEM,
Carnegie-Mellon Univ., Pittsburgh, Pa.
For primary bibliographic entry see Field 5G.
W76-12521

WATER SUPPLIES FROM ULSTER VALLEY GRAVELS,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
For primary bibliographic entry see Field 4B.
W76-12524

OPTIMIZATION OF DESIGN CAPACITY OF AN AQUEDUCT,
California Univ., Berkeley. Lawrence Berkeley Lab.
For primary bibliographic entry see Field 4A.
W76-12526

BAYESIAN APPROACH TO TILE DRAIN DESIGN,
Ecole Polytechnique Federale de Lausanne (Switzerland). Dept. of Agriculture.
For primary bibliographic entry see Field 8B.
W76-12527

QUANTITATIVE ASSESSMENT OF ENVIRONMENTAL IMPACT,
Parsons (Ralph M.) Co., Pasadena, Calif. Systems Div.
For primary bibliographic entry see Field 6G.
W76-12528

A STUDY OF RESEARCH AND DEVELOPMENT IN ENVIRONMENTAL ENGINEERING USING SYSTEM APPROACH,
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
For primary bibliographic entry see Field 6B.
W76-12533

EVALUATING TISZA RIVER BASIN DEVELOPMENT PLANS USING MULTIATTRIBUTE UTILITY THEORY,
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
For primary bibliographic entry see Field 4A.
W76-12534

THE USE OF COMPUTER TECHNIQUES AND AUTOMATION FOR WATER RESOURCES SYSTEMS.
Economic Commission for Europe (UN), New York. Committee on Water Problems, Economic and Social Council.
Proceedings of a Symposium organized by the Committee on Water Problems of the United Nations Economic Commission for Europe, Washington, D.C., March-April 1974. 186 p, 41 fig, 7 tab, 101 ref.

Descriptors: *Water resources development, Computers, *Automation, *Management, *Methodology, *Planning, *Optimization, *Simulation analysis, Economics, Social aspects, River basins, Reservoirs, Water quality, Water supply, Mathematical models, Systems analysis, Storm water, Hydrology, Waste water treatment, Decision making, Equations.
Identifiers: Cost minimization.

Presented are thirty-three discussion papers dealing with the use of computer techniques and automation to facilitate water resources development planning and management. Many of the articles present case studies to illustrate the application of a proposed methodology, i.e., simulation and/or optimization techniques. Participating countries include the United States, France, Great Britain, West Germany, Russia, the Netherlands, Romania, Finland, and Hungary. The papers are organized under the following three principle topics: (1) general objectives of the use of computer techniques and automation for water resources systems; (2) water quality and quality models for planning; and (3) socio-economic models for planning. The symposium as a whole supports the use of computerized methods to aid in the solution of national and regional complex, comprehensive water planning and management problems. (See W76-12536 thru W76-12567) (Bell-Cornell)
W76-12535

PRESENT SITUATION AND TRENDS IN THE APPLICATION OF ADVANCED METHODS AND TECHNIQUES FOR WATER RESOURCES MANAGEMENT.
Economic Commission for Europe (UN), New York.
For primary bibliographic entry see Field 7C.
W76-12536

PROFESSIONAL REQUIREMENTS OF MODERN WATER ENGINEERS INVOLVED IN RIVER BASIN MANAGEMENT UTILIZING CONTEMPORARY TOOLS,
Bureau of Reclamation, Sacramento, Calif. Mid-Pacific Regional Office.
For primary bibliographic entry see Field 4A.
W76-12537

OPTIONS OF DEVELOPMENT AND INTEGRATED MANAGEMENT OF WATER RESOURCES,
Ecole Nationale Superieure des Mines de Paris, Fontaine-bleau (France). Center for Geological Information.
For primary bibliographic entry see Field 6B.
W76-12538

TECHNIQUES OF SIMULATION FOR HYDROLOGIC COMPUTATION, IN QUANTITY AND QUALITY, OF INTEGRATED WATER RESOURCES DEVELOPMENTS,
Office de la Recherche Scientifique et Technique Outre-Mer, Paris (France). Dept. of Fundamental Research Bureau.
M. Roche.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C. 1974, Volume II, p 16-19.

Descriptors: *Water resources development, *Simulation analysis, Water quality, Hydrology, Operations, Projects, Hydrologic data, Mathematical models, Time, Hydraulics, Water supply.

In a broad sense, any equipment and organization aimed at satisfying water demands in quantity and quality, satisfying power demands, and protecting man, his environment and his production tools against flood damage and pollution may be considered as a water resources project. When the study concerns a one-structure project, aimed at satisfying only one demand, i is often possible to make estimations with simplified methods, although even in this case using mathematical models may be very useful. For projects involving several structures, various sources of water and multiple uses, it becomes quite impossible to process without using sophisticated methods. Simulation of operating management is then one of the methods which may be used. This article discusses the principle of simulation and describes a water system and its operation. Considered also are the organization of a model for simulation (programme) and input data and their statement. (See also W76-12535) (Bell-Cornell)
W76-12539

USE OF SIMULATION MODELS FOR THE EVALUATION OF A REGIONAL WATER-RESOURCE SYSTEM,
Water Resources Board, Reading (England).
D. G. Jamieson.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., 1974, Volume II, p 19-23. 1 fig, 5 ref.

Descriptors: *Water resources development, *Simulation analysis, *Regional analysis, Evaluation, Mathematical models, Optimization, *Planning, *Design, Reservoir storage, Computers, Computer programs, Water supply, Water quality, Systems analysis, Flow.
Identifiers: Storage capacity, Synthetic flow data.

In the United Kingdom, piecemeal promotion of new reservoir schemes by local authorities is being superseded by planned development of water resource systems on both a regional and national basis. Each new addition of storage is now considered as an element of a much larger system and must be assessed in conjunction with other existing and proposed storages in that system. Planning models have been formulated for purposes of identifying a limited number of near-optimal least-cost solutions for satisfying the forecast water demands. But since planning models are restricted to using simple evaluation routines, the assumptions made in deriving the near-optimal solutions need substantiating. This process is referred to as the design stage, its purpose being to define the storage capacity and pump sizes of each new element in order to meet the water demands on the total system and any water quality constraints with a given acceptable reliability. This paper considers the design stage of water resource planning; discussed are traditional techniques, simulation of water quantity, simulation of water quality, and optimization. (See also W76-12535) (Bell-Cornell)
W76-12540

APPLICATION OF DYNAMIC PROGRAMMING IN FRAMING OPERATING RULES FOR A MULTI-PURPOSE DAM,
Societe Grenobloise d' Etude et d' Applications Hydrauliques (France).
For primary bibliographic entry see Field 4A.
W76-12541

DYNAMIC PROGRAMMING FOR DETERMINATION OF A STORM WATER OUTLET SYSTEM OF PIPES AND FLOOD-DAMPING DAMS,
Societe Grenobloise d'Etude et d' Applications Hydrauliques (France).
For primary bibliographic entry see Field 4A.
W76-12542

INTEGRATED MATHEMATICAL MODELS USED FOR GROUNDWATER RESOURCES PLANNING IN AREAS INFLUENCED BY HUMAN SETTLEMENTS,.
Technische Universitaet, Hanover,(West Germany). Institut fuer Wasserwirtschaft, Hydrologie und Landwirtschaftlichen Wasserbau.
For primary bibliographic entry see Field 4B.
W76-12543

OPTIMIZATION OF GROUNDWATER WITHDRAWALS WITH REGARD TO TECHNICAL AND HYDROLOGICAL CONSTRAINTS,
Technische Universitaet, Hanover (West Germany). Institut fuer Wasserwirtschaft, Hydrologie und Landwirtschaftlichen Wasserbau.
For primary bibliographic entry see Field 4B.
W76-12544

INFLUENCE OF SPECIAL CONSTRUCTIONS IN REGIONAL WASTE WATER SYSTEMS AND THEIR ROLE IN MATHEMATICAL MODELS FOR PLANNING.
Karlsruhe Univ. (West Germany). Institut fuer Hydromechanik, Staunanlagen und Wasserversorgung.
For primary bibliographic entry see Field 5D.
W76-12545

A QUANTITATIVE MODEL FOR THE PLANNING OF SURFACE WATER RESOURCES: USE OF MIXED VARIABLE LINEAR PROGRAMMING,
Ardour-Garonne Agency, Toulouse (France), Programming Group.
For primary bibliographic entry see Field 4A.
W76-12546

APPLICATION OF MATHEMATICAL MODELLING TO WATER QUALITY FORMATION PROCESSES FOR OPERATIVE MANAGEMENT OF COMPLEX WATER RESOURCES SYSTEMS,
Vsesoyuznyi Nauchno-Issledovtelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
For primary bibliographic entry see Field 5G.
W76-12547

EXPERIENCES WITH MATHEMATICAL MODELS USED FOR WATER QUALITY AND QUANTITY PROBLEMS,
Rijkswaterstaat, The Hague(Netherlands), Data Processing Div.
J. Voogt, and C. B. Vreugdenhil.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., April 1974, Vol. II, p 52-87. 22 fig, 21 ref.

Descriptors: *Model studies, Water resources, *Water quality, Computers, *Methodology, Management, Drainage, Networks, Discharge(Water), Cooling water, Waste water(Pollution), Estuaries, Storage, Systems analysis, Water supply.
Identifiers: Morphological aspects.

The use of models of whatever kind is prompted by the fact that they enable us to study and understand processes under existing or future conditions without interfering with the actual prototype situation. Presented is a detailed, comprehensive study of the use of mathematical modeling to solve water quality and quantity problems. Considered are computational methods, including one- and two-dimensional models. A number of one-dimensional problems is discussed: (1) water management in drainage networks; (2) water management in the Delta (Netherlands) region; (3) high discharges along the Rhine branches; (4) cooling water circulation; (5) water quality in storage basins; and (6) waste water in estuaries. Two-dimensional problems studied are: (1) waste concentrations on the coast; (2) waste water in estuaries; and (3) steady flow in lakes. Discussed finally are morphological aspects. In conclusion, in many cases it is possible to obtain reasonable results with fairly simple tools. A major drawback is that many models contain some empirical parameters which must be determined anew for each new application. (See also W76-12535) (Bell-Cornell)
W76-12548

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY'S STORM WATER MANAGEMENT MODEL,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 5G.
W76-12549

RIVER SYSTEM MODELLING FOR OPERATIONAL FORECASTING,
National Weather Service, Silver Spring, Md. Hydrologic Research and Development Lab.
For primary bibliographic entry see Field 4A.
W76-12550

SYSTEMS SIMULATION AS A TOOL FOR WATER RESOURCE PLANNING, INCLUDING QUALITATIVE ASPECTS,
Bureau of Reclamation, Denver, Colo. Research and Engineering Center.
For primary bibliographic entry see Field 4A.
W76-12551

THE SOLUTION OF THE REGIONALIZATION PROBLEM BY CERTAIN BRANCH-AND-BOUND METHODS,
Karlsruhe Univ. (West Germany). Institut fuer Hydromechanik, Staunanlegen und Wasserversorgung.
For primary bibliographic entry see Field 5D.
W76-12552

SURFACE WATER AND GROUND WATER INTERACTION PHENOMENA IN PLANNING MODELS,
Geological Survey, Washington, D. C.
For primary bibliographic entry see Field 4B.
W76-12553

MATHEMATICAL SIMULATION AND OPTIMIZATION OF FLOOD CONTROL SYSTEMS,
Belorusskii Central Research Inst. for Water Resources, Minsk.
For primary bibliographic entry see Field 4A.
W76-12554

SIMULATION MODEL OF THE QUANTITATIVE AND QUALITATIVE EVOLUTION OF WATER RESOURCES AT DIFFERENT POINTS OF A RIVER-BASIN (ORNE),
Financial Agency of the Basin 'Seine-Normandie', Paris(France). Water Resources Div.
For primary bibliographic entry see Field 4A.
W76-12555

THE 'POLPOLE' MODEL: AN ATTEMPT TO ANALYSE THE WATER SYSTEM IN THE FINANCIAL AGENCY OF A FRENCH RIVER BASIN,
Financial Agency of the Basin 'Seine-Normandie', Paris (France).
For primary bibliographic entry see Field 4A.
W76-12556

USE OF INVESTMENT MODELS FOR THE LONG-TERM PLANNING OF A WATER RESOURCE SYSTEM FOR ENGLAND AND WALES,
Water Resources Board, Reading (England).
K. F. Clarke.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., April 1974, Vol. II, p 137-143. 1 fig, 3 ref.

Descriptors: *Water resources development, *Long-term planning, *Investment, *Alternative planning, *Simulation analysis, Computers, Computer programs, Analytical techniques, Mathematical models, Optimization, Linear programming, Constraints, Economics, Water demand, Systems analysis.
Identifiers: *England, *Wales, Integer programming, Cost minimization.

The geographical and temporal distribution of rainfall in England and Wales causes a problem of water conservation and creates the need for a comprehensive strategy of water resources development. This article describes a modeling methodology for determining an economically optimal development, including the capital investment decision of which resources to develop and the decision of which demand centers to supply. Using integer programming, the first model provides a full search of the alternative development programs and minimizes the objective function. Then a simulation model, based on a suite of programs, computes annual water allocations and a detailed breakdown of costs. The six basic stages in the simulation model analysis are outlined. Included is the determination of the optimal plan of the staging and sizing of pipe and pumps. The maximum flow is used to size the plant and the average flow is used in computing the running costs. The final stage computes the total annual incidence of costs and discounted costs. (See also W76-12535) (Bell-Cornell)
W76-12557

USE OF OPTIMIZATION MODELS FOR WATER RESOURCES ALLOCATION AND CHOICE OF INVESTMENTS BY MEANS OF COMPUTERS,
Research and Design Inst. for Water Resources Engineering, Bucharest (Rumania). Water Economy Section.
C. Parvulescu.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., April 1974, Vol. II, p 144-150. 4 fig, 1 ref.

Descriptors: *Water resources development, *Methodology, *Water allocation(Policy), *Planning, Optimization, Investment, Computers, Economics, Hydrologic aspects, Dynamic programming, Simulation analysis, Equations, Systems analysis.
Identifiers: Cost minimization.

Presented is a method for water resources development planning and allocation intended to eliminate as much as possible the drawbacks of existing methods. Given the growing complexity of water management problems, most methods are insufficient. Existing methods artificially divide into fragments the unitary character both of water utilization phenomena and water resources development systems. Moreover, problems of quality and quantity are approached separately. Not enough consideration is given the interrelationship between the internal expenses of water users and the external expenses of water resources developmet works. Assumptions and principles of the proposed method are given. Considered are the elements and relationships regarding the technological and economical aspects of water utilization by each user. Using the new methodology, optimization of the dimensioning and operation elements of a water system is considered. The optimization criterion is to minimize system costs. Utilized are dynamic programming and simulation analysis. Advantages of the method include: the possibility of establishing the transition moment from the natural flow regime to the developed flow regime of the source; and allowance for a judicious calculus of penalties that must be paid by the water users that deviate from optimal strategy of system dimensioning or operation. (See also W76-12535) (Bell-Cornell)
W76-12558

TASAM, A METHOD FOR SETTING GOALS, EVALUATING AND COMPARING PLANS,
KM Insinooritoimisto oy Kauppamiehentie, Tapiola (Finland).
A. Jaatinen.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., April 1974, Vol. II, p 151-154.

Descriptors: *Evaluation, *Planning, *Computers, *Methodology, Decision making, Water

resources, Environment, Resources allocation, Benefits, Value.
Identifiers: Goals, *TASAM method, *Goal hierarchy.

Consciousness of goals in planning and assessing the value of plans in relation to the realization of a set of goals are becoming the most important phases in the entire planning process. The more comprehensive the planning, the more the quantity and contradiction of the goals set for the results of the planning increase. Presented is TASAM, a computer method which helps decision makers achieve goal-setting and evaluation of plans by means of a simple and systematic process. As problems become more complex, it enables the handling of goals in different mutual logic relationships. The method makes possible the evaluation of matters that cannot be assessed in terms of money or other measuring units. In addition, the improvability information derived from TASAM enables the allocation of the resources available in the best way possible. (See also W76-12535) (Bell-Cornell)
W76-12559

THE APPLICATION OF MATHEMATICAL MODELS AND OPTIMIZATION TECHNIQUES IN PLANNING WATER SUPPLY AND WASTE WATER DISPOSAL SYSTEMS,
Michigan Univ., Ann Arbor. Dept. of Environmental and Industrial Health.
R. A. Deininger.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., April 1974, Vol. II, p 154-157. 1 ref.

Descriptors: *Water supply development, *Waste water disposal, *Planning, *Optimization, Mathematical models, Decision maing, *Water resources, Water quality, River basins, Water quality control, *Environmental control, Systems analysis.
Identifiers: *Developing countries, Health improvement.

The World Health Organization believes firmly that mathematical models and optimization techniques play an important role in solving the problems of environmental control for the improvement of the health of the population, particularly in developing countries. Considered herein is the use of these methods by planners and engineers as tools providing increased capabilities of generating information that can be used in the decision-making process. Discussed also are water supply models and waste water disposal models. WHO is actively using these techniques in many projects to varying degrees; they have become important aids for modern environmental health engineers and planners. (See also W76-12535) (Bell-Cornell)
W76-12560

USE OF INVESTMENT MODELS AND CHOICE OF ALTERNATIVE DECISIONS FOR THE OPTIMUM DISTRIBUTION OF WATER RESOURCES AT THE STAGE OF PLANNING BY MEANS OF COMPUTERS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
V. K. Papisov, Oziransky, A. V. Abramova, and V. V. Rappoport.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., April 1974, Vol. II, p 157-162. append.

Descriptors: *Water distribution(Applied), *Water resources, *Long-term planning, *Economics, *Optimization, Alternative planning, Computers, Investment, Decision making, River basins, Water supply, Simulation analysis, Mathematical models, Equations, Systems analysis.
Identifiers: *USSR, Cost minimization, Multivariant analysis.

The optimum distribution of water resources of a country by areas and branches of the national economy is the necessary condition for their rational use, expecially in the territorial redistribution of river flow. In the USSR, different variants of using water resources are assessed from the viewpoint of investments for the creating of national economy complexes. Hence models for optimizing water distribution are investment-type models. Financial expenditures include annual operation expenses and depreciation. Choice of the optimum variant of the distribution of water resources is made by the minimum of the 'discounted' expenditure. This report deals with a model for optimizing the use of interbasinflow transfer by the branches of the national economy and areas on the stage of designing and long-term planning. For problem solution, a model of inter-area, inter-branch and intra-brach optimization has been elaborated, simulating an upper level of the development of the economy. The model consists of hierarchically subordinated blocks describing a complex economic system. (See also W76-12535) (Bell-Cornell)
W76-12561

ELABORATION AND USE OF A MATHEMATICAL MODEL TO FORECAST IN QUANTITY AND QUALITY, THE WATER DEMANDS OF VARIOUS SECTORS OF INDUSTRY,
Societe du Canal de Provence et d'Amenagement de la Region Provencale Le Tholonet, Aix-en-Provence (France).
For primary bibliographic entry see Field 6D.
W76-12562

OPTIMAL DEVELOPMENT PROGRAMME FOR REGIONAL WATER SUPPLY SYSTEMS,
National Water Authority, Budapest (Hungary).
I. Orloci.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., April 1974, Vol. II, p 166-169.

Descriptors: *Water supply development, *Regional development, *Economics, *Optimization, *Mathematical models, Water demand, Systems analysis.
Identifiers: *Hungary, Cost minimization.

This article considers an economic optimization model which has been applied in preparing a water supply development program in an important industrial region of Hungary. The model is associated with economic measures which are realized in the increase of the capacity of waterworks. The criterion for optimal operation is the sum of damages due to unsatisfied demands resulting from the expensiveness of measures and the limited funds of investment. The model is divided into three main parts: (1) the background of operation, comprising the natural-social processes; (2) the siting model, involving the building-block system construction of potential engineering solutions; and (3) the scheduling of investments. In the course of mechanical computations, the optimal parameters of the water supply system corresponding to average evolution have been determined on the basis of about 500 criteria from around 800 decision alternatives. (See also W76-12535) (Bell-Cornell)
W76-12563

SIMPLIFIED DECISION MODEL FOR NATIONAL WATER SUPPLY DEVELOPMENT,
National Water Authority, Budapest (Hungary).
J. Csuka.
The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., April 1974, Vol. II, p 169-174. 1 fig, 8 equ.

Descriptors: *Water supply development, *Water management(Applied), *Decision making, *Long-term planning, *Regional analysis, *Linear programming, Optimization, Equations, Waste water(Pollution), Water quality, Stochastic processes, Projects, Systems analysis.
Identifiers: *Hungary, Developing countries.

In the evolution of water management, the complete, comprehensive control of runoff, as well as the utilization of water resources to the maximum possible engineering and economic benefits at the simultaneous observation of the highly complex interrelations between regional, sectorial, social and economic interests, emerge as problems of growing significance. The main problems of decision making to meet these demands and a scheme of the system of mathematical models corresponding is given. The decision is directed at the determination of the combination of water management hydro-technical projects satisfying optimally various interests, with due consideration to economic, natural legal, political and social interrelations and allowance for the laws of physics, as well as for other effects anticipated in other domains of life and the natural environment. A long-range planning model for water supply has been evolved in Hungary. The model is a linear, deterministic programming model which functions dynamically by the determination and defined interrelations of its variables. (See also W76-12535) (Bell-Cornell)
W76-12564

COMPUTER APPLICATION IN PROCESSING TECHNICAL AND ECONOMIC DATA FOR OPTIMIZING COMPLEX WATER RESOURCES SYSTEMS,
Belorussian Central Research Inst. for Water resources, Minsk.
A. N. Kolobaev, and A. V. Skatchek.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C. April 1974, Vol. II, p 175-177.

Descriptors: *Water resources development, Computers, *Economics, *Optimization, *Data processing, Data transmission, Data collections, *Computer programs, Comprehensive planning, Systems analysis.
Identifiers: USSR.

The large-scale development of water resources systems imposes more stringent requirements for water object design, construction, and operation. One of these is to make technical and economic provisions for water projects. Great progress has recently been made in the USSR in developing optimization methods for water resources systems, but a lack of needed statistical, project, and economic planning information impedes the introduction of advanced mathematical-economical models and hampers efficient management. The introduction of a system for data collection, transmission, processing and analysis, the development of methods for water resources optimization, and the large-scale application of automatic devices and instruments facilitate transition to automatic optimized water resources management systems. Listed herein are the optimization tasks, the basic information needed to solve operating conditions optimization tasks, and the technical and economic data required for systems optimization. The use of computers to facilitate the comprehensive, complex information ga'hering, storage and retrieval is discussed. (See also W76-12535) (Bell-Cornell)
W76-12565

CONSTRUCTION AND UTILIZATION OF COMPLEX MATHEMATICAL MODELS IN THE PLANNING OF THE OPTIMAL DEVELOPMENT OF LARGE HYDROGRAPHIC SYSTEMS AND RIVER BASINS,
Ecole Nationle Superieure des Mines de Paris, Fontainebleau(France). Center for Geological Information.
For primary bibliographic entry see Field 4A.
W76-12566

THE RECREATIONAL USE OF WATER AS PART OF THE INTEGRATED PLANNING OF LARGE WATER SYSTEMS,
National Water Board of Finland, Helsinki. Office for Water Pollution and Recreation Use of Waters.
For primary bibliographic entry see Field 6B.
W76-12567

AN APPROACH TO RESEARCH ADMINISTRATION,
Texas Univ. at Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 6B.
W76-12575

6B. Evaluation Process

THE WINOOSKI WORKSHOPS: AN ASSESSMENT OF SPECIFIED WORKSHOP TECHNIQUES FOR STIMULATING AND IMPROVING PUBLIC INVOLVEMENT IN WATER RESOURCES,
Vermont Univ., Burlington. Water Resources Research Center.
A. S. Wilm, and K. L. Thomas.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 545, $5.00 in paper copy, $3.00 in microfiche. Completion Report, (1975). 90 p, 4 fig, 9 tab, 56 ref. OWRT A-020-Vt(1). 14-31-0001-5046.

Descriptors: Communication, River basins, Water resources, *Social participation, *Vermont, Water quality, Planning, Social aspects, *Attitudes.
Identifiers: *Public participation, *Winooski River Basin(Vt).

Public participation is a dynamic communication process within a social system, a source of information and support for social and economic goals. Current interest in citizen participation is sparked by changes in social values and more specifically by a change in the public's perception of government responsibility. Vermont is drawing up its River Basin Water Quality plans for the major rivers of the State. Agencies have called for citizen input. This provided an opportunity to test a commonly used workshop technique for involving citizens against a second format which involved a more social-psychological orientation and small group problem-solving techniques. The purpose of this project was to test the hypothesis that differences in environmental settings reflect, and are reflected in citizen motivation levels to become involved in water resource decision-making. Two distinctly different types of meetings were held in the Winooski River Basin. A secondary focus was an analysis of citizen motivations to become involved as reflected in questionnaire responses and attendance rates. Participants for this study were found by use of a variation of the technique developed to identify 'community influentials'. Differences found, due to the environmental settings, reflect research findings observed in more 'controlled' experimentation.
W76-12151

ALLOWANCE FOR THE STOCHASTIC CHARACTER OF HYDROLOGICAL DATA IN WATER PROJECT DECISIONS,
National Water Authority, Budapest (Hungary). Engineering Secretariat.
For primary bibliographic entry see Field 7A.
W76-12439

ECONOMIC UNCERTAINTIES IN WATER RESOURCES PROJECT DESIGN,
Eotovs Lorand Univ., Budapest(Hungary).
For primary bibliographic entry see Field 6A.
W76-12514

A DYNAMIC REGIONAL MODEL FOR EVALUATING RESOURCE DEVELOPMENT PROGRAMS,
Manitoba Univ., Winnipeg. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4A.
W76-12520

A STUDY OF RESEARCH AND DEVELOPMENT IN ENVIRONMENTAL ENGINEERING USING SYSTEM APPROACH,
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
M. Thompson.
Research Report, RR-74-13, International Institute for Applied Systems Analysis, Laxenburg, Austria, August 1974. 54 p, 3 fig.

Descriptors: *Research and development, *Environmental engineering, *Systems analysis, *Social aspects, Mathematical models, Management, Water quality, Air pollution, Effects, Economics, Political aspects, Standards, Monitoring, Disasters.
Identifiers: Information flow network, Incentives, International level.

Established is a systems conception for problems of the environment which will serve as foundation for eleven recommendations upon the ways in which research and development efforts in this area may beneficially be redirected. Scientific and managemental approaches to the environment have become fettered by a narrowness of perspective that has limited their potential contributions. Viewpoints adopted in directing and performing research activities should be broadened (1) in geographical extent, (2) in conceptual reach, (3) to embrace more environmental systems, (4) to consider natural systems explicitly, (5) to account for the interconnections of the environment with other social systems, and (6) to heed the social system through which the environment is maintained. Presented are three models of the encompassing social system as it affects the environment. The models feature: a micro-economic view of the firms and households which may despoil the environment; the basic political mechanisms through which environmental wrongs can be set right; and the network of information flows necessary to manage the environment. These systems are examined to identify their weaknesses and discover points of leverage where improvements may be effected. Special attention is devoted to: the distributional equity of proposed policies; the possibilities for direct management of environmental systems; the need for preparation in advance of environmental disasters, the establishment of standards, and environmental monitoring. Finally, the study identifies environmental responsibilities at the international level which crucially require fulfillment. (Bell-Cornell)
W76-12533

EVALUATING TISZA RIVER BASIN DEVELOPMENT PLANS USING MULTIATTRIBUTE UTILITY THEORY,
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
For primary bibliographic entry see Field 4A.
W76-12534

THE USE OF COMPUTER TECHNIQUES AND AUTOMATION FOR WATER RESOURCES SYSTEMS.
Economic Commission for Europe (UN), New York. Committee on Water Problems, Economic and Social Council.
For primary bibliographic entry see Field 6A.
W76-12535

PRESENT SITUATION AND TRENDS IN THE APPLICATION OF ADVANCED METHODS AND TECHNIQUES FOR WATER RESOURCES MANAGEMENT.
Economic Commission for Europe (UN), New York.
For primary bibliographic entry see Field 7C.
W76-12536

OPTIONS OF DEVELOPMENT AND INTEGRATED MANAGEMENT OF WATER RESOURCES,
Ecole Nationale Superieure des Mines de Paris, Fontaine-bleau (France). Center for Geological Information.
Y. Emsellem.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C. 1974, Volume II, p 11-15.

Descriptors: *Water resources development, *Management, *Planning, *Methodology, *Cost-benefit analysis, Optimum development plans, Hydraulic systems, Economics, Mathematical models, Environment, Comprehensive planning, Water pollution control.
Identifiers: *France, Multiple objectives.

Planning for the management and use of water resources depends first on the political aims of development and secondly on the consequences induced by the application of these programs. The characteristic of these two types of variables is to imply essentially an important part of nonnumerical values. More precisely, the classical cost-benefit analysis only takes into account the market values. However, for progress, a larger methodology, taking into consideration the nonnumerical character of the out-of-market variables of the environment is needed and has been developed. In order to develop concrete procedures, a group of nine inter-disciplinary teams is experimenting on the 115.000 sq. km. basin of the Agence Financiere 'Adour-Garonne' in France. The general attempt is to build as large as possible, using the best available tools, and to study the different aspects related with complex problems, such as the variations of certain parameters with policy. Since programming helps to clarify and optimize the objective function and big computers may handle large systems efficiently, the natural method is to try and represent the problems by a model which can be programmed. (See also W76-12535) (Bell-Cornell)
W76-12538

SURFACE WATER AND GROUND WATER INTERACTION PHENOMENA IN PLANNING MODELS,
Geological Survey, Washington, D. C.
For primary bibliographic entry see Field 4B.
W76-12553

USE OF INVESTMENT MODELS FOR THE LONG-TERM PLANNING OF A WATER RESOURCE SYSTEM FOR ENGLAND AND WALES,
Water Resources Board, Reading (England).
For primary bibliographic entry see Field 6A.
W76-12557

USE OF OPTIMIZATION MODELS FOR WATER RESOURCES ALLOCATION AND CHOICE OF INVESTMENTS BY MEANS OF COMPUTERS,
Research and Design Inst. for Water Resources Engineering, Bucharest (Rumania). Water Economy Section.
For primary bibliographic entry see Field 6A.
W76-12558

TASAM, A METHOD FOR SETTING GOALS, EVALUATING AND COMPARING PLANS,
KM Insinooritoimisto oy Kauppamiehentie, Tapiola (Finland).
For primary bibliographic entry see Field 6A.

W76-12559

USE OF INVESTMENT MODELS AND CHOICE OF ALTERNATIVE DECISIONS FOR THE OPTIMUM DISTRIBUTION OF WATER RESOURCES AT THE STAGE OF PLANNING BY MEANS OF COMPUTERS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
For primary bibliographic entry see Field 6A.
W76-12561

SIMPLIFIED DECISION MODEL FOR NATIONAL WATER SUPPLY DEVELOPMENT,
National Water Authority, Budapest (Hungary).
For primary bibliographic entry see Field 6A.
W76-12564

COMPUTER APPLICATION IN PROCESSING TECHNICAL AND ECONOMIC DATA FOR OPTIMIZING COMPLEX WATER RESOURCES SYSTEMS,
Belorussian Central Research Inst. for Water resources, Minsk.
For primary bibliographic entry see Field 6A.
W76-12565

THE RECREATIONAL USE OF WATER AS PART OF THE INTEGRATED PLANNING OF LARGE WATER SYSTEMS,
National Water Board of Finland, Helsinki. Office for Water Pollution and Recreation Use of Waters.
M. Sarkka.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., April 1974, Vol II, p 180-186.

Descriptors: *Recreation, *Water utilization, *Planning, *Water resources, *Lake shores, Computers, Estimating, Boats, Environment, Beaches, Swimming, Water pollution, Mathematical models, Methodology, Systems analysis, Regional analysis.
Identifiers: *Finland, Regional planning.

Since the 1950s, the recreational use of water has developed to such a high extent in Finland that it now plays a very central role in all forms of regional planning. This article considers mathematical models for various types of data processing and outlines some examples of applications of planning techniques for recreational uses of watercourses. Considered are: estimation of volume of boat traffic; classification of lake shores from the viewpoint of recreational use; classification of lakes and their shores with a view to recreational use and environmental protection in regional planning; estimation of beaches' suitability for swimming on the basis of factors that influence this appropriateness; and a study of recreational uses of watercourses in the Lohja District. (See also W76-12535) (Bell-Cornell)
W76-12567

AN APPROACH TO RESEARCH ADMINISTRATION,
Texas Univ. at Austin. Center for Research in Water Resources.
I. Zimmerman.
Completion Report, December 1975. 49 p, 31 ref. OWRT X-146 (4270)(1).

Descriptors: *Research and Development, *Water resources development, *Resources development, *Comprehensive planning, Evaluation, Energy budget, Water demand, Water requirements, Water management, Water supply, Analytical techniques, *Research priorities, *Great Plains, Energy.
Identifiers: Research implementation, Problem identification research, Innovation research, *Feasibility reserach, Consequences research(Northern Great Plains), Research administration.

A procedure is described for analyzing research problem areas, identifying possible courses of research, selecting alternative courses, comparatively evaluating such courses and implementing research activities. Types of research that are needed in the course of problem solving are problem identification research, innovation research, feasibility research and consequences research. This general approach to research administration is partially illustrated in relation to the problem of increasing water supplies for energy production in the northern Great Plains region.
W76-12575

BENEFIT COST ANALYSIS--A NECESSARY PART OF ENVIRONMENTAL DECISIONING,
Minnesota Univ., Duluth. Dept. of Economics.
For primary bibliographic entry see Field 6G.
W76-12576

NORTHEASTERN UNITED STATES WATER SUPPLY STUDY, INTERIM REPORT, CRITICAL CHOICES FOR CRITICAL YEARS.
Army Engineer Div. North Atlantic, New York.
For primary bibliographic entry see Field 6D.
W76-12584

OUTDOOR RECREATION PLANNING AND RESEARCH IN THE U.S.A.,
National Foundation for Scientific Research (NFWO), Ghent (Belgium).
E. Van de Walle.
Research report, No. 2, November, 1975. 49 p.

Descriptors: *Planning, *Recreation, *Recreation facilities, *National recreation areas, Parks, Bureau of Outdoor Recreation(BOR), Government, Texas, Washington DC, Michigan, Wisconsin, Colorado, Wyoming, Utah, California.
Identifiers: Outdoor recreation, *Outdoor recreation research, Statewide Comprehensive Outdoor Recreation Plan(SCORP), Nationwide Outdoor Recreation Plan.

Information is presented on the organization of outdoor recreation research in the United States, listing of recreation specialists contacted, comments concerning important U.S. research reports and books on the subject, and a portion of the results obtained in the study. The study includes sections on Texas, Washington, D.C., Michigan, Wisconsin, Colorado, Wyoming, Utah and California. Various public agencies, Federal and State, are discussed in some detail. Concluding remarks indicate that public involvement in providing recreation opportunity at all levels is an essential element. Three federal departments have major research responsibilities: (1) the Department of the Interior, where the Bureau of Outdoor Recreation concentrates on nationwide planning with statewide outdoor recreation coordinated through regional offices. Research is conducted by universities or independent institutions under BOR sponsorship; (2) The Department of Agriculture where research is conducted by regional Forest Range and Experiment Stations and Agricultural Experiment Stations; (3) The Corps of Engineers which has an active research program related to future reservoir planning. Almost all research programs at the state level are related to the Statewide Comprehensive Outdoor Recreation Plan (SCORP). A multiple regression analysis is used to determine the influence of socio-economic factors and independent variables upon participation rates. It is thought that Western European countries can benefit from studying the way recreation planning is done in the U.S., though the vastness of the land obviously gives recreation in the U.S. some unique characteristics. (Smith - North Carolina)
W76-12585

MANAGEMENT OF WATER RESOURCES UNDER DIFFERENT SOCIO-ECONOMIC CONDITIONS,
Arizona Univ., Tucson.
S. M. H. Bokhari.
Available from University Microfilms, Inc., Ann Arbor, Mich. 48106. Order No. 76-11, 320. Ph.D. Thesis, 1975, 306 p.

Descriptors: *Water management(Applied), *Planning, *Social aspects, *Regional economics, *Regional development, Regional analysis, United States, Asia.
Identifiers: *Pakistan, Welton-Mohawk Irrigation District.

Major lags still exist between the developed and developing countries with respect to water management, and theory and practices diverge even in the developed countries. The Welton-Mohawk Irrigation District in the United States and the Salinity Control and Reclamation Project Number One in Pakistan are compared as examples of water management under different sociological conditions. Multi-disciplinary teams of professionals from developing countries should be trained to make planning and management more effective. Implementation capabilities in developing countries should be improved, so that projects can be completed more rapidly. Adequate financial allocation is required during implementation and operation. The latest rain harvesting and runoff agricultural techniques should be introduced in dry farming area in Pakistan's upland plateau. Tubewells will make the system more flexible and save funds for important complementary programs. There should be more emphasis on planning, operations, and evaluation of public investments concerned with water. (Snyder-FIRL)
W76-12626

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ENERGY COSTS OF WASTEWATER REUSE,
Arizona Univ., Tucson. Economic and Business Research.
For primary bibliographic entry see Field 5D.
W76-12215

ECONOMIC COSTS OF CONTROLLING WATER QUALITY THROUGH MANAGEMENT OF IRRIGATION RETURN FLOWS,
Washington State Univ., Pullman. Coll. of Agriculture.
For primary bibliographic entry see Field 5G.
W76-12218

DISPOSAL ALTERNATIVES FOR INTERMITTENT SAND FILTER SCRAPINGS UTILIZATION AND SAND RECOVERY,
Utah Center for Water Resources Research, Logan.
For primary bibliographic entry see Field 5D.
W76-12219

COST OF WATER POLLUTION CONTROL IN THE CARPET INDUSTRY,
Exxon Research and Engineering Co., Florham Park, N.J. Water Pollution Control Section.
For primary bibliographic entry see Field 5G.
W76-12422

COST FUNCTIONS FOR WASTEWATER CONVEYANCE SYSTEMS,
Louvain Univ. (Belgium). Groupe de Travail en Economie de l'Environnement.
For primary bibliographic entry see Field 5D.
W76-12513

AVERAGE RISE OF EPA PLANT, SEWER INDEXES SLOWS.
For primary bibliographic entry see Field 5D.
W76-12598

SEWAGE PLANT UPGRADES EFFLUENT.
For primary bibliographic entry see Field 5D.
W76-12613

6D. Water Demand

PRELIMINARY ANALYSIS OF GEOHYDROLOGIC DATA FROM TEST WELLS DRILLED NEAR CHALK POINT, PRINCE GEORGES COUNTY, MARYLAND,
Geological Survey, Parkville, Md.
For primary bibliographic entry see Field 4B.
W76-12289

IMPACT OF HURRICANE TIDAL SURGES ON SUBSEQUENT LAND USE CHANGES AND WATER RESOURCES REALLOCATION,
University of Southern Mississippi, Hattiesburg. Dept. of Geography and Area Development.
For primary bibliographic entry see Field 4A.
W76-12461

ELABORATION AND USE OF A MATHEMATICAL MODEL TO FORECAST IN QUANTITY AND QUALITY, THE WATER DEMANDS OF VARIOUS SECTORS OF INDUSTRY,
Sôciete du Canal de Provence et d'Amenagement de la Region Provencale Le Tholonet, Aix-en-Provence (France).
C. Bareau.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., April 1974, Vol. II, p 163-165. 1 tab.

Descriptors: *Water supply, *Forecasting, *Industrial water, *Water quality, Water demand, Industries, Planning, Hydraulics, Methodology, Management.
Identifiers: *Southwestern France.

In hydraulics development schemes, supply and demand are expressed by the same physical quantity. From such data, planning bodies try to optimize water supply management to meet various potential uses. Today, this methodology is no longer satisfactory; the supply concept itself must be re-defined. Water management patterns must account for each and every parameter of quality. Presented is a method for forecasting industrial water supply. To each area of use, the pattern connects a five-dimensional request vector, determined from an inquiry made in southwestern France. Five ranges of water use for manufacturers have been examined: (1) waters used for conveyance; (2) cooling waters; (3) heating waters; (4) manufacture waters; and (5) sanitary and home waters. Results show that factories having identical products manufactured require very different unitary water quantity vectors. The results are aggregated for the whole industrial areas of the investigated zone, including the five uses mentioned and seven activity areas corresponding to an industrial amalgamation used in the national statistics. (See also W76-12535) (Bell-Cornell)
W76-12562

NORTHEASTERN UNITED STATES WATER SUPPLY STUDY, INTERIM REPORT, CRITICAL CHOICES FOR CRITICAL YEARS.
Army Engineer Div. North Atlantic, New York.
November 1975. 89 p, 16 fig, 7 tab, 97 ref.

Descriptors: *Water supply, *Water demand, *Water shortage, *Water resources development, Population, *New York, *Massachusetts, *Rhode Island, *Water management, Water quality, Water reuse, Water yield improvement, Droughts, Planning, *District of Columbia.
Identifiers: *Washington Metropolitan Area, *New York Metropolitan Area, *Eastern Massachusetts-Rhode Island Metropolitan Area.

Critical problems of developing water supply sources to meet growing demand are foreseen in the next 20 to 25 years for 3 metropolitan areas, Washington, New York and Eastern Massachusetts-Rhode Island. Major alternatives for water supply, along with advantages and disadvantages, are examined so that responsible government decisions can be made. Population projections were used to year 2020 to predict water demand. Possible supply alternatives were identified for each area to determine critical needs. By 2020 population of 80 million is predicted for this region which extends from Maine to Virginia. Along with the 3 critical metropolitan areas explored here, 26 other urban areas with potential long range problems have been studied in a separate report. Solutions offered must meet 4 criteria: reliability, flexibility, timeliness, and equity. Underlying premises are: demand will increase with population and economic growth, direct reuse of waste water will not be widely accepted, there will be no changes in ownership of water supplies, droughts will continue to occur, and demand cannot be materially reduced through legislation or changing habits before the 1990s. No major water supply projects have been built in the critical areas since the 1960s yet safe yields in some systems have been repeatedly surpassed. It is noted that considerable increase in price (in multiples of 100%) is needed to affect demand. Sources, projects and illustrative combinations of projects are given for each critical area. Several branches of a decision tree are explored, each considering a different mix of goals such as cost, environmental quality, regional needs, reliability and equity. (Smith-North Carolina)
W76-12584

6E. Water Law and Institutions

GROUNDWATER PROPERTY RIGHTS AND CONTROVERSIES IN MONTANA,
Montana State Univ., Bozeman. Dept. of History, Government and Philosophy.
R. Dunbar.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 516, $5.00 in paper copy, $3.00 in microfiche. Research Report No. 76, Montana University Joint Water Resources Research Center, Bozeman, April 1976, 75 p. OWRT A-059-MONT(1).

Descriptors: Water law, *Groundwater, *Property rights, *Water rights, *History, Prior appropriation, *Montana, Regulation.
Identifiers: *Water law history, *Montana water law.

When Montana was dubbed the Treasure State, few of her citizens were aware of the abundance of groundwater beneath their feet. Nor were they concerned about the property right in it, a right which their lawmakers had borrowed from the more humid states. However, as Montanans began to learn through hydrologic surveys the extent of the resource and to increase its exploitation, some farsighted individuals sought first to conserve it through regulation of the right and then to change the right itself. These efforts provoked controversies. Out of the crucible of these controversies, Montanans forged a new property right and new institutions to protect it. This report is an historical analysis and accounting of these controversies. (Holje-Montana State)
W76-12154

REFORM OF ILLINOIS WATER RESOURCE LAWS WITH PARTICULAR REFERENCE TO THE DRAINAGE CODE AND CLOSELY RELATED LAWS,
Illinois Univ. at Urbana-Champaign. Dept. of Agricultural Economics.
D. L. Uchtmann, and N. G. P. Krausz.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 538, $5.00 in paper copy, $3.00 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 114, June 1976. 94 p, append. OWRT A-076-ILL(1). 14-31-0001-6014.

Descriptors: *Water districts, Organizations, *Jurisdiction, *Institutions, Governments, *Planning, Control, Regulation, Coordination, *Illinois, Water law, Water rights, Legal aspects, *State governments, Drainage districts, Legislation.
Identifiers: *Drainage codes(Law).

Laws affecting Illinois water resources form a highly complex and fragmented water resource system. Many special purpose or general governmental units have varying responsibility in areas of drainage, soil and water conservation, sewage treatment and water quality, water supply and use, flood control, recreation and navigation. This existing structure gives rise to numerous inherent problems. Each state adjoining Illinois has made significant changes in its system for administering and controlling water. In addition, Nebraska, Ohio and Florida have made significant changes in their water systems. The water law programs of these states have been analyzed to determine if procedures and structure might be adopted for Illinois. Regarding drainage laws, in particular, a survey of drainage district attorneys and engineers in Illinois identifies specific areas of dissatisfaction. The surveys also offer suggestions for improvement. Recommendations for reform of Illinois water resource laws include a long term reform of the overall structure. This long term recommendation includes the establishment of a state agency with broad powers in areas of general planning and coordination and the combining of many existing local special purpose districts into multi-purpose local districts. The recommendations also include specific changes to the existing drainage code that can be accomplished independent of the overall restructuring.
W76-12217

PROCEEDINGS OF THE TWENTY-EIGHTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE.
Miami Univ., Fla.
For primary bibliographic entry see Field 6G.
W76-12226

MULTIPLE-USE CONFLICTS BETWEEN FISHERMEN AND OTHER USERS OF THE OCEAN WITH A CONSIDERATION OF A POSSIBLE EXPANDED FEDERAL ROLE,
National Oceanic and Atmospheric Administration, Rockville, Md., Office of Living Resources.
For primary bibliographic entry see Field 6G.
W76-12227

FLOOD-HAZARD EFFECTS ON RESIDENTIAL PROPERTY VALUES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6G.
W76-12529

WATER QUALITY LAW IN FEDERAL REPUBLIC OF GERMANY,
Bonn Univ. (West Germany). Inst. fuer das Recht der Wasserwirtschft.
For primary bibliographic entry see Field 5G.
W76-12531

A LEGAL-HISTORICAL ANALYSIS OF NAVIGATION USER CHARGES,
Department of Environment, Ottawa (Ontario).
P. M. Ashton, C. Cooper-Ruska, and L. A. Shabman.

Journal of the Water Resources Planning and Management Division, Proceedings of the American Society of Civil Engineers, Vol. 102, No. WR1, p 89-100, April 1976. 32 ref.

Descriptors: *Water resources, *Navigation, Economics, History, Legislation, Water policy, Water law, Political aspects, Investment, Efficiencies, *Canada.
Identifiers: *Waterways(Transportation), *Navigation user charges.

Toll-free use of the nation's inland waterway transportation network is shown to be a political and economic anachronism. The historical development of this free-use policy is traced from the early days of promotion of regional economic development under the legal sanctions of the commerce Clause of the Constitution and the Northwest Ordinance. In an age of scarce funds for public works, the toll-free waterway program seems to be an outstanding candidate for application of the 'beneficiaries pay' principle. Equity considerations, promotion of efficiency between transport modes, and public investment efficiency considerations suggest that a revision might be legal in theory but would likely face substantial political opposition in practice. (Bell-Cornell)
W76-12532

THE 'POLPOLE' MODEL: AN ATTEMPT TO ANALYSE THE WATER SYSTEM IN THE FINANCIAL AGENCY OF A FRENCH RIVER BASIN,
Financial Agency of the Basin 'Seine-Normandie', Paris (France).
For primary bibliographic entry see Field 4A.
W76-12556

USE OF INVESTMENT MODELS FOR THE LONG-TERM PLANNING OF A WATER RESOURCE SYSTEM FOR ENGLAND AND WALES,
Water Resources Board, Reading (England).
For primary bibliographic entry see Field 6A.
W76-12557

A METHODOLOGY TO MEASURE THE PERFORMANCE OF THE EPA REGIONAL EIS REVIEW PROCESS,
Argonne National Lab., Ill. Energy and Environmental Studies Div.
For primary bibliographic entry see Field 6G.
W76-12583

OUTDOOR RECREATION PLANNING AND RESEARCH IN THE U.S.A.,
National Foundation for Scientific Research (NFWO), Ghent (Belgium).
For primary bibliographic entry see Field 6B.
W76-12585

6F. Nonstructural Alternatives

FLOOD DAMAGE REDUCTION POTENTIAL OF RIVER FORECAST SERVICES IN THE CONNECTICUT RIVER BASIN,
National Weather Service, Silver Spring, Md. Office of Hydrology.
For primary bibliographic entry see Field 4A.
W76-12186

FLOOD HAZARD ANALYSES FOR LOWER MARSH CREEK (INCLUDING SELECTED TRIBUTARIES), BANNOCK COUNTY, IDAHO.
Soil Conservation Service, Boise, Idaho.
For primary bibliographic entry see Field 4A.
W76-12580

CLARKS CREEK FLOOD PLAIN STUDY, CATAWBA COUNTY, NORTH CAROLINA.
Soil Conservation Service, Raleigh, N. C.
For primary bibliographic entry see Field 4A.
W76-12582

FLOOD HAZARD ANALYSES REPORT: EAST BRANCH NIMISHILLEN CREEK, STARK COUNTY, OHIO.
Soil Conservation Service, Columbus, Ohio.
For primary bibliographic entry see Field 4A.
W76-12586

FLOOD HAZARD INFORMATION: BACKLICK CREEK, VIOLET TOWNSHIP, FAIRFIELD COUNTY, OHIO.
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 4A.
W76-12592

FLOOD PLAIN INFORMATION: FRESH-WATER CREEK, HUMBOLDT COUNTY, CALIFORNIA.
Army Engineer District, San Francisco, Calif.
For primary bibliographic entry see Field 4A.
W76-12593

FLOOD PLAIN INFORMATION: YELLOW RIVER, PART III, METROPOLITAN ATLANTA, GEORGIA.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 4A.
W76-12595

6G. Ecologic Impact Of Water Development

COASTAL ENGINEERING CONFERENCE. FOURTEENTH. PROCEEDINGS. COPENHAGEN, DENMARK, JUNE 24-28, 1974.
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 5G.
W76-12221

ENVIRONMENTAL ANALYSIS FOR BAHAMAS SUPERTANKER PORT,
Erindale College (Ontario).
For primary bibliographic entry see Field 5G.
W76-12222

ENVIRONMENTAL PROBLEMS ASSOCIATED WITH A PIPELINE LANDFALL IN COASTAL DUNES AT CRUDEN BAY, ABERDEENSHIRE, SCOTLAND,
Aberdeen Univ. (Scotland).
For primary bibliographic entry see Field 5G.
W76-12223

OCEAN 72, IEEE INTERNATIONAL CONFERENCE ON ENGINEERING IN THE OCEAN.
Institute of Electrical and Electronics Engineers, Inc., New York.
For primary bibliographic entry see Field 5G.
W76-12224

ENVIRONMENTAL CONSIDERATIONS OF OFFSHORE GENERATING STATIONS,
Public Service Electric and Gas Co., Newark, N.J.
For primary bibliographic entry see Field 5G.
W76-12225

PROCEEDINGS OF THE TWENTY-EIGHTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE.
Miami Univ., Fla.
Gulf and Caribbean Fisheries Institute Proceedings of the Twenty-Eighth Annual held in Bal Harbour, Florida, October, 1975, Published in May 1976. 113 p. J. B. Higman, (ed).

Descriptors: *Continental Shelf, *Environmental effects, Resources development, Water resources, *Fisheries, Biology, Conferences, Biota, Gulf of Mexico.
Identifiers: *Outer Continental Shelf, New York Bight, Caribbean Sea.

A collection of 18 papers constitute the proceedings of the Twenty-Eighth Annual Gulf and Caribbean Fisheries Institute held October 1975 at Bal Harbour, Florida, under the sponsorship of the University of Miami and NOAA Sea Grant Program. Separate sessions were devoted to the subjects: Fisheries jurisdiction, Fisheries biology, and the Continental Shelf. A Fisheries workshop was included. (See W76-12227 thru W76-12229) (Sinha - OEIS)
W76-12226

MULTIPLE-USE CONFLICTS BETWEEN FISHERMEN AND OTHER USERS OF THE OCEAN WITH A CONSIDERATION OF A POSSIBLE EXPANDED FEDERAL ROLE,
National Oceanic and Atmospheric Administration, Rockville, Md., Office of Living Resources.
R. F. Smith.
In: Gulf and Caribbean Fisheries Institute, Proceedings, Twenty-Eight Annual held in Bal Harbour, Florida, October 1975, May 1976. p. 27-34.

Descriptors: *Continental Shelf, *Resources development, *Environmental effects, *Fisheries, *Recreation demand, *Commercial fishing, *Governmental interrelation, Coasts, Planning, Multiple purpose.
Identifiers: *Outer Continental Shelf.

This paper considers the various types of multiple-use conflicts faced by commercial fishermen, and reviews the role of the Federal Government in helping fishermen and workers in other industries to make a living on the same ocean at the same time. The physical, economic, and social aspects of ocean development that may affect the abilty of fishermen to function effectively under mounting multiple-use conflicts are discussed. These problems are not new; but they are no longer localized to a few fishing ports or on isolated fishing grounds. Instead, they occur coast-wide--indeed, worldwide. They are becoming far more complex and have potential impacts upon many more fishermen. The conflicts occur because of competition for ocean space and port facilities, competition for labor and service, and pressures upon the fishermen to change his life style. Such competition and pressures may cause injury, endanger lives, damage vessels and gear, create costly delays, or force a fisherman against his will into other occupations or social patterns. In summary, we are moving into an era of dramatically increasing activity and development throughout most of our continental shelf area. This will have a tremendous impact on the economy and social patterns in many of the nation's coastal communities, and the ultimate effects are difficult to predict. The fact is that there are no major technical problems impeding ocean development that are beyond the capacity of science and engineering to solve. The real problem is in the resolution of social economic, and other multiple-use conflicts. (See also W76-12226) (Sinha-OEIS)
W76-12227

IDENTIFICATION AND MAPPING OF FISHING BANKS ON THE OUTER CONTINENTAL SHELF OF THE GULF OF MEXICO,
Bureau of Land Management, New Orleans, La.
D. Elvers, and J. B. Johnston.
In: Gulf and Caribbean Fisheries Institute, Proceedings, Twenty-Eighth Annual held in Bal Harbour, Florida, October 1975, May 1976. p 35-48, 7 fig, 2 tab, 22 ref.

Descriptors: *Continental Shelf, *Gulf of Mexico, *Environmental effects, *Resources development, Water resources, *Leases, Fish, Management, Mapping, Drilling.
Identifiers: *Outer Continental Shelf, Fishing banks, Fishing grounds, Environmental impact.

The Bureau of Land Management (BLM) began leasing in Gulf federal waters for oil, gas, and sulfur in 1954. Between 1954 and 1971, 23 lease sales were held with the value of the prospects the principal factor guiding the sales. In 1971, formal environmental impact statement preparation began and by 1973 concern for fishing banks, shrimping area, shipwrecks, and coral reefs brought about special stipulations in the Florida Middle Ground, Stetson Bank, East and West Flower Garden banks, and 18 Fathom Lump. Fishing grounds related to bathymetric and geologic features for the Gulf of Mexico can be accurately mapped with modern navigation, side scan sonar, and narrow beam soundings. BLM hopes to add additional details to fishing grounds by use of BLM, NOS, and industry data taken in the course of special studies for impact statements, baseline investigations, archaeologic, and geologic hazard surveys for the Gulf of Mexico and South Atlantic continental shelf and slope. (See also W76-12226) (Sinha - OEIS)
W76-12228

CONTAMINANT EFFECTS ON BIOTA OF THE NEW YORK BIGHT,
State University of New York at Stony Brook. MESA New York Bight Project
For primary bibliographic entry see Field 5C.
W76-12229

BASIC REMOTE SENSING INVESTIGATIONS FOR BEACH RECONNAISSANCE: AN INTERIM REPORT,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 2L.
W76-12375

COMPARISON OF ECOLOGICAL IMPACTS OF POSTULATED OIL SPILLS AT SELECTED ALASKAN LOCATIONS. VOLUME I. INTRODUCTION, SUMMARY, METHODOLOGY, EVALUATION AND APPENDICES,
Mathematical Sciences Northwest, Inc., Bellevue, Wash.
For primary bibliographic entry see Field 5C.
W76-12379

TOXIC EFFECTS OF OIL DISCHARGED FROM SHIPS,
Exxon Research and Engineering Co., Linden, N.J. Government Research Labs.
For primary bibliographic entry see Field 5C.
W76-12380

SAND LEVEL CHANGES ON TORREY PINES BEACH, CALIFORNIA,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 2L.
W76-12383

ANALYSIS OF THE ROLE OF THE GULF INTRACOASTAL WATERWAY IN TEXAS,
Texas Engineering Experiment Station, College Station.
For primary bibliographic entry see Field 5G.
W76-12389

ENVIRONMENTAL IMPLICATIONS OF MAINTENANCE AND IMPROVEMENT OF THE GULF INTRACOASTAL WATERWAY IN TEXAS,
Texas A and M Univ., College Station. Coll. of Agriculture.
For primary bibliographic entry see Field 5G.
W76-12390

IMPACT OF A MAINSTREAM IMPOUNDMENT ON THE FISH FAUNA OF BIG WALNUT CREEK A SCIOTO RIVER TRIBUTARY IN CENTRAL OHIO,
Ohio State Univ., Columbus. Dept. of Zoology.
T. M. Cavender, and R. L. Crunkilton.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 844, $7.50 in paper copy, $3.00 in microfiche. Ohio Water Resources Center, Columbus, Project Completion Report No. 449, (1976). 191 p, 9 fig, 24 tab, 27 ref. OWRT A-037-OHIO(1).

Descriptors: *Stream fisheries, Dams, *Fish migration, Aquatic environment, *Reservoir fisheries, *Warm-water fish, Sport fish, Rough fish, Water analysis, Temperature, Dissolved oxygen, Pre-impoundment, Post-impoundment, *Fish behavior, *Ohio, Turbidity, Ecology, *Environmental effects, Correlation analysis, Impoundments, *Fish food organisms.
Identifiers: *Fish species diversity, *Big Walnut Creek(Ohio), Hoover Reservoir(Ohio), Scioto River tributory(Ohio).

The accumulated effects of impoundment on Hoover Reservoir have altered the composition and distribution of fishes in Big Walnut Creek. These changes in part have resulted from inundation of the stream channel, prevention of migration, alteration in water velocity, substrate turbidity, temperature and dissolved oxygen. These alterations either directly or indirectly affect species by changing the stream's ecology. Temperature was reduced significantly in the tailwater area affecting the reproductive biology of as many as 22 species of fish that normally migrate to spawn. Turbidity levels fluctuated widely, but were dampened in the tailwater area due to settling action in the reservoir allowing two species of turbidity-intolerant fish to become established. Dissolved oxygen levels never fell below the recommended level of 5 ppm, but the effects of a reduced oxygen level on food organisms are unknown. Widespread changes in the overall fish fauna of Big Walnut occurred as a result of impoundment. Five separate statistical analyses demonstrated these changes. In addition to commonly used indices, a new technique, correlation analysis, was a useful tool in describing how the associations between fish species in communities are changed by impoundment. It was established that diversity (H) at selected stations above and below Hoover Reservoir on Big Walnut remained unchanged, while significant changes occurred in the qualitative makeup of the fish fauna. This indicates that diversity (H) used in conjunction with descriptive analysis provides an overall description of changes resulting from stream impoundment.
W76-12465

INTERDISCIPLINARY MODELS OF WATER SYSTEMS,
Central and Southern Florida Flood Control District, West Palm Beach.
For primary bibliographic entry see Field 6A.
W76-12516

QUANTITATIVE ASSESSMENT OF ENVIRONMENTAL IMPACT,
Parsons (Ralph M.) Co., Pasadena, Calif. Systems Div.
B. Loran.
Journal of Environmental Systems, Vol 5, No 4, p 247-256, 1975. 2 fig, 8 ref.

Descriptors: *Environment, *Assessment, History, Projects, Algorithms, Waste water treatment, Treatment facilities, Decision making, Water quality, Construction, Operations, Systems analysis, Administrative agencies.
Identifiers: *Environmental impact assessment, Value ratings.

The history of environmental impact and the current requirements, guidelines, and coverage of environmental impact statements are briefly reviewed. A procedure for the assessment of environmental impact is presented. The individual components of the environment induced by a proposed action and of the natural environment of the project area are listed, and each impact generated by their interaction is assigned value ratings. The ratings are assembled in an impact-incidence matrix, which is then reordered using a data analysis technique, the bond energy algorithm. The new matrix obtained displays interrelated clusters of high-valued ratings, corresponding to critical environmental areas. The impacts comprising each area are grouped according to similarity of action and effect, and their association may suggest environmental alternatives. The environmental impact from the construction of an additional wastewater treatment plant in a resort area is assessed to illustrate the effectiveness of the procedure. (Bell-Cornell)
W76-12528

FLOOD-HAZARD EFFECTS ON RESIDENTIAL PROPERTY VALUES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Economics.
L. A. Shabman, and D. I. Damianos.
Journal of the Planning and Management Division, Proceedings of the American Society of Civil Engineers, Vol 102, No WR1, p 151-162, April, 1976. 4 tab, 10 ref.

Descriptors: Water resources, Floods, *Flood damage, *Hazards, *Flood control, Zoning, Prices, Land, Equations, Systems analysis, Regression analysis, Flood plain insurance.
Identifiers: Multiple regression analysis, Economic analysis, *Flood hazards.

Inasmuch as the potential for flooding can reduce property values, individuals will be encouraged to promote government policies that reduce the damages of flooding, such as dams or subsidized flood insurance. On the other hand, policies that limit the use of flood-prone land may reduce the value of such land even beyond the reduction due to flooding potential. Thus, political choice may be biased toward structural or property-enhancing measures as opposed to measures which reduce property values, regardless of what the socially 'best' set of measures might be. To empirically investigate the validity of the preceding arguments, the influence of flood hazard on residential property values has been estimated, examining two case study areas. Use of multiple regression analysis to analyze actual sale prices of land parcels has indicated that: (1) the existence of flood risk lowers land value; (2) structural flood-control measures increase land prices; and (3) the influence of flood-plain zoning cannot be easily identified. (Bell-Cornell)
W76-12529

BENEFIT COST ANALYSIS--A NECESSARY PART OF ENVIRONMENTAL DECISIONING,
Minnesota Univ., Duluth. Dept. of Economics.
J. M. Peterson.
Journal of Environmental Systems, Vol. 5, No. 4, p 291-297, 1975. 1 fig, 5 ref.

Descriptors: *Environment, *Cost-benefit analysis, *Pollution abatement, Water quality, Decision making, Optimization, Costs, Benefits, Ecology, Economics, Wastes, Effluents, Rivers, Social aspects, Systems analysis.
Identifiers: Economic optimum.

Society may use cost-benefit analysis to set priorities in determining the level of environmental pollution they wish to tolerate. The benefits of pollution are derived from the production and consumption of goods and services necessary to life. The estimated social costs of this productive activity are the costs necessary to reduce or eliminate the wastes from the effluents discharged into the environment. Therefore, cost-benefit analysis is appropriate in environmental decision making since its proper use insures that society can reach the ecological stability level without violating the economic optimum. However, ecological stability may not always be a rational choice, particularly when dealing with ecological sub regions rather than the global ecosphere. (Bell-Cornell)
W76-12576

DEVELOPMENT OF RESIDUALS MANAGEMENT STRATEGIES,
Indiana Univ., Bloomington. School of Public and Environmental Affairs.
For primary bibliographic entry see Field 5G.
W76-12581

A METHODOLOGY TO MEASURE THE PERFORMANCE OF THE EPA REGIONAL EIS REVIEW PROCESS,
Argonne National Lab., Ill. Energy and Environmental Studies Div.
B. P. Butz, and M. J. Senew.
Report No. ANL/ES-41. December 1974. 66 p, 1 fig, 14 tab, 18 ref, 2 append. IAG-D4-H543.

Descriptors: *Methodology, *Evaluation, Management, Planning, Environment, *Environmental effects, *Regional analysis.
Identifiers: *Environmental Impact Statement(EIS).

The purpose is to develop a methodology that can be used by the Office of Federal Activities (OFA), part of the Environmental Protection Agency, to measure the performance of the regional Environmental Impact Statement (EIS) review process. Distribution of regional resources for EIS review varies significantly among regions, and without explanation. This study evaluates factors that may cause such differentials; develops criteria that may be used in assessing resources requirements; and develops measures of accomplishment for the EIS review activity. Five regional offices, the OFA staff, the EIS reporting system and available literature were scrutinized. Each region will submit quarterly reports which describe most significant EISs reviewed, and why these EISs were significant together with descriptions of preliminary liason with other agencies, staff assistance supplied and interaction with other EPA offices. To evaluate performance of the review process at the regional level, guidelines are suggested: each type of EIS should meet certain criteria; an OFA team should be established to review selected EISs and determine performance of the region. To improve performance appropriate staff must be available in their region, EIS review must be thorough and uniform, and seminars related to EIS review should be conducted. An example checklist is given which would be used in EIS review. In an appendix a staffing algorithm is given which should aid in establishing appropriate regional staffs. (Smith - North Carolina)
W76-12583

7. RESOURCES DATA

7A. Network Design

ALLOWANCE FOR THE STOCHASTIC CHARACTER OF HYDROLOGICAL DATA IN WATER PROJECT DECISIONS,
National Water Authority, Budapest (Hungary). Engineering Secretariat.
J. Csuka.
Hydrological Sciences Bulletin, Vol. 21, No. 1, p 61-68, March 1976. 1 fig, 4 ref.

Descriptors: *Stochastic processes, *Hydrologic data, *Water management(Applied), *Risks, Value, *Decision making, Water supply, Water resources, Water, Water demand, Irrigation water, Equations, Water utilization, Model studies.
Identifiers: *Water project decisions, Irrigation water supply, Water supply time series, Annual net benefits, Risk pool.

A method was presented for formulating the operating model of water use that included the uncertainty related to the hydrological factors in water management decisions. The model was used for simulating a long time series for water supply, on the basis of which economic data were generated with the help of specific economic indices. The risk pool was estimated, and in the case of project alternatives, decisions allowing for uncertainty were based on the investment costs including the risk pool. Where the costs of risks associated with the alternative selected could be charged, together with the relevant costs against the user, the problem became one of calculating the water rate including risk. The water rate was the annual cost of operation plus the profit and was obtained as the ratio of the water volume delivered. (Roberts-ISWS)
W76-12439

A HIGH SIERRA PRECIPITATION MEASUREMENT PROGRAM, FINAL REPORT ON THE 1975 SEASON,
Atmospherics Inc., Fresno, Calif.
For primary bibliographic entry see Field 2B.
W76-12446

IMPLEMENTATION OF A LARGE SCALE WATER QUALITY DATA MANAGEMENT SYSTEM,
Carnegie-Mellon Univ., Pittsburgh, Pa.
For primary bibliographic entry see Field 5G.
W76-12521

7B. Data Acquisition

CENTRAL SIERRA PROFILING SNOW GAGE: A GUIDE TO FABRICATION AND OPERATION,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2C.
W76-12158

DEVELOPMENT OF A RADIOACTIVE ISOTOPE PROFILING SNOW GAGE,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2C.
W76-12159

SEASONAL SNOW SURFACE ENERGY BALANCE IN A FOREST OPENING,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2C.
W76-12160

MEASUREMENT OF SNOWPACK WETNESS,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2C.
W76-12162

SNOW WETNESS MEASUREMENTS FOR MELT FORECASTING,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 2C.
W76-12165

REMOTE SENSING OR SNOWPACK DENSITY USING SHORTWAVE RADIATION,
National Environmental Satellite Service, Washington, D.C.
For primary bibliographic entry see Field 2C.
W76-12167

O18/O16 ABUNDANCE VARIATIONS IN SIERRA NEVADA SEASONAL SNOWPACKS AND THEIR USE IN HYDROLOGICAL RESEARCH,
Calgary Univ. (Alberta). Dept. of Physics.
For primary bibliographic entry see Field 2C.
W76-12169

RADAR DERIVED SPATIAL STATISTICS OF SUMMER RAIN - EXPERIMENT DESCRIPTION,
Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.
I. Katz, A. Arnold, J. Goldhirsh, T. G. Konrad, and W. L. Vann.
Contractor Report NASA CR-2592, Vol. I of III, September 1975. 87 p, 21 fig, 8 tab, 56 ref. NASA/DOD S-70248AG.

Descriptors: *Virginia, *Radar, *Rainfall, *Data processing, Analytical techniques, Equipment, Instrumentation, Antennas, Projects, Rain, Precipitation(Atmospheric), Summer, Statistics, Weather, Storms, Attenuation, Communication, Remote sensing, Monitoring, Measurement, Meteorology, Electrical engineering.
Identifiers: *Wallops Island(Va), *Radar-weather, Space communication, Rain cell statistics.

An experiment was performed at Wallops Island, Virginia, to obtain a statistical description of summer rainstorms. Its purpose was to obtain information needed for design of earth and space communications systems in which precipitation in the earth's atmosphere scatters or attenuates the radio signal. Rainstorms were monitored with the high resolution SPANDAR radar and the 3-dimensional structures of the storms were recorded on digital tape. Volume I of this series described the equipment, the experiment and tabulated all data obtained during the experiment. (See also W76-12179 and W76-12180) (Sims - ISWS)
W76-12178

RADAR DERIVED SPATIAL STATISTICS OF SUMMER RAIN - DATA REDUCTION AND ANALYSIS,
Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.
T. G. Konrad, and R. A. Kropfli.
Contractor Report NASA CR-2592, Vol. II of III, September 1975. 171 p, 97 fig, 10 tab, 10 ref. NASA/DOD S-70248AG.

Descriptors: *Radar, *Rainfall, *Virginia, *Data processing, *Analytical techniques, Precipitation(Atmospheric), Rain, Summer, Weather, Mathematical models, Statistical models, Statistics, Communication, Attenuation, Remote sensing, Measurement, Meteorology.
Identifiers: *Radar-weather, *Wallops Island(Va), Space communications, Rain cell statistics, Rain cell descriptions.

Volume II of the three volumes constituted the final report on the rain statistics program. In this volume, the data reduction and analysis procedures were discussed along with the physical and statistical descriptors used. The statistical modeling techniques were outlined and examples of the derived statistical characterization of rain

cells in terms of the several physical descriptors were presented. Recommendations concerning analyses which can be pursued using the data base collected during the experiment were included. (See also W76-12178 and W76-12180) (Sims - ISWS)
W76-12179

RADAR DERIVED SPATIAL STATISTICS OF SUMMER RAIN - APPENDICES.
Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.
Contractor Report NASA CR-2592, Vol. III of III, September 1975. 212 p, 4 append. NASA/DOD S-70248AG.

Descriptors: *Radar, *Virginia, *Rainfall, *Data processing, *Equipment, Electrical engineering, Calibrations, Antennas, Meteorology, Remote sensing, Measurement, Analytical techniques, Meteorological data, Weather data, Statistics.
Identifiers: *Radar-weather, *Wallops Island(Va), Radar-video processor, Radar calibrations, Frequency diversity.

Volume III, Appendices of the Final Report on rain statistics, is a collection of selected important memoranda written during the course of the experiment. The titles of memoranda are: (1) A Frequency Diversity Source Developed for Rain Statistics Program, (2) Technical Manual for Propagation Experiment Controller and Radar Video Processor, (3) SPANDAR Calibration Activities, and (4) Meteorological Summaries for Periods of SPANDAR Rain Observation May Through August 1973. (See also W76-12178 and W76-12179) (Sims - ISWS)
W76-12180

A STUDY OF THE UTILIZATION OF ERTS-1 DATA FROM THE WABASH RIVER BASIN,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
D. A. Landgrebe.
Available from the National Technical Information Service, Springfield, Va 22161 as N75-27 522, $10.50 in paper copy, $3.00 in microfiche. LARS Informative Note 052375, Final Report, August 1974. 337 p, 93 fig, 54 tab, 15 ref. NASA NAS5-21773.

Descriptors: *Remote sensing, *Illinois, *Indiana, *Missouri, *Idaho, *Kansas, *Wisconsin, *Satellites(Artificial), *Data processing, Mapping, Crops, Agriculture, Soils, Soil classification, Land use, Land classification, Urbanization, Water resources, Surface waters, Lakes, Rivers, Land resources, Vegetation, Equations, Forests, Aerial photography, Analytical techniques.
Identifiers: *ERTS, Chicago(Ill), Gary(Ind), *Lake Freeman(Ind), *Lake Shafer(Ind), Milwaukee(Wis), Finney County(Kan), Tippecanoe County(Ind), Marion County(Ind), White County(Ind), Indianapolis(Ind), Cook County(Ill), Milwaukee County(Wis), *Wabash River Basin.

The general objectives were: (1) to evaluate the applications of ERTS-1 measurements which have been appropriately reduced for use in specific earth resources problems, and (2) to determine the desirable measurements needed in future earth resources systems. Five scientific investigations were reported which were pursued to evaluate the applications of ERTS-1 measurements to specific earth resources problems. To further support these objectives, four specific supporting technology tasks were also included. The nine tasks were all based on the use of digital computer techniques for studying ERTS data in digital form. The conclusions for this study were numerous and were included in each of the nine sections describing results for each project. The overall conclusions were that ERTS-1 data shows potential for crop mapping, urban land use mapping, and water resources mapping. Less favorable results were observed for soil association mapping and earth surface features identification; however these studies were limited in scope. (Sims -ISWS)
W76-12183

STUDY OF THE LOWER STRATOSPHERIC THERMAL STRUCTURE AND TOTAL OZONE FROM NIMBUS-4 IRIS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 2B.
W76-12184

RAINFALL GENERATION: A NONSTATIONARY TIME-VARYING MULTIDIMENSIONAL MODEL,
Puerto Rico Univ., Mayaguez. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W76-12208

BASIC REMOTE SENSING INVESTIGATIONS FOR BEACH RECONNAISSANCE: AN INTERIM REPORT,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 2L.
W76-12375

SELF-MONITORING PROCEDURES: BASIC LABORATORY SKILLS (164.6) STUDENT REFERENCE MANUAL,
Charles County Community Coll., La Plata, Md.
For primary bibliographic entry see Field 5A.
W76-12377

REMOTE SENSING OF MARINE HYDROCARBON SEEPS,
Barringer Research Ltd., Rexdale (Ontario). (Assignee).
For primary bibliographic entry see Field 5A.
W76-12411

INFLUENCE OF SURFACE WAVES ON SUBSURFACE CURRENT MEASUREMENTS IN SHALLOW WATER,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 2L.
W76-12431

A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 2F.
W76-12432

REMOTE SENSING OF MISSISSIPPI RIVER CHARACTERISTICS,
Colorado State Univ., Fort Collins, Dept. of Civil Engineering.
J. F. Ruff, M. M. Skinner, B. R. Winkley, D. B. Simons, and D. E. Dorratcague.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol. 102, No. WW2, Proceedings Paper 12150, p 189-202, May 1976. 9 fig, 4 ref, 1 append.

Descriptors: *Remote sensing, *Aerial photography, *Rivers, *Mississippi River, *Infrared radiation, Photography, Sediments, Temperature, Aerial photography, Turbidity, Potamology, Sedimentology, Flow, Eddies, On-site investigations, Floods.
Identifiers: *Aerial infrared photography, *Thermal infrared imagery.

The Corps of Engineers, Vicksburg District, initiated a data collection program to develop a workable knowledge of the principles relating to the transport of water and sediment to gain a better understanding of the Mississippi River characteristics. Aerial photographs and thermal infrared imagery were collected over two test reches at low and high water stages. Qualitative interpretation of the data related to the river characteristics such as flow patterns, relative velocities, sediment concentration distribution, water-depth effects, and effects of man-made structures. Ground truth information was correlated with the remotely sensed data. (Sims-ISWS)
W76-12442

CAPACITANCE SENSOR FOR SOIL MOISTURE MEASUREMENT,
State Univ. of New York at Buffalo.
For primary bibliographic entry see Field 2G.
W76-12457

NUCLEAR MAGNETIC RESONANCE SENSORS FOR MOISTURE MEASUREMENT IN ROADWAYS,
Southwest Research Inst., San Antonio, Tex.
For primary bibliographic entry see Field 2G.
W76-12458

INVESTIGATION OF FILTRATION CHARACTERISTICS OF A NONWOVEN FABRIC FILTER,
Marks-Rosen, Inc., Knoxville, Tenn.
For primary bibliographic entry see Field 2G.
W76-12459

AN IMPROVED IN SITU PH SENSOR FOR OCEANOGRAPHIC AND LIMNOLOGICAL APPLICATIONS,
California Univ., Los Angeles. Dept. of Geology.
A. Ben-Yaakov, and E. Ruth.
Limnol Oceanogr. 19(1), 144-150,1974.

Descriptors: *Hydrogen ion concentration, Instrumentation, Oceanography, Limnology, Analytical techniques, Electrodes, Measurement.
Identifiers: *Carbonate saturometry, Ion selective electrodes.

An improved in situ pH sensor and signal conditioner suggest that an accuracy of 0.02 pH can be achieved and that ion selective electrodes can be useful in situ experiments such as carbonate saturometry.--Copyright 1974, Biological Abstracts, Inc.
W76-12479

7C. Evaluation, Processing and Publication

OPTIMIZATION OF REAL TIME DAILY OPERATION OF A MULTIPLE RESERVOIR SYSTEM,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 4A.
W76-12155

ICE THICKNESS OBSERVATIONS, NORTH AMERICAN ARCTIC AND SUBARCTIC, 1970-71, 1971-72,
Cold Regions Research and Engineering Laboratory, Hanover, N. H.
For primary bibliographic entry see Field 2C.
W76-12182

A STUDY OF THE UTILIZATION OF ERTS-1 DATA FROM THE WABASH RIVER BASIN,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
For primary bibliographic entry see Field 7B.

W76-12183

ATMOSPHERIC STRUCTURE AND VARIABILITY IN AREAS OF CONVECTIVE STORMS DETERMINED FROM 3-H RAWINSONDE DATA,
Texas A and M Univ., College Station. Center for Applied Geosciences.
For primary bibliographic entry see Field 2B.
W76-12185

CONTINUATION OF THE ARIZONA WATER INFORMATION SYSTEM (AWIS),
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 10D.
W76-12216

WABASH RIVER SYSTEMS MODEL - TERMINAL REPORT PHASE I,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-12220

IDENTIFICATION AND MAPPING OF FISHING BANKS ON THE OUTER CONTINENTAL SHELF OF THE GULF OF MEXICO,
Bureau of Land Management, New Orleans, La.
For primary bibliographic entry see Field 6G.
W76-12228

SHADOW LENGTH TABLES FOR LATITUDE 42 DEGREES NORTH,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W76-12242

SHADOW LENGTH TABLES FOR LATITUDE 50 DEGREES NORTH,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W76-12243

SHADOW LENGTH TABLES FOR LATITUDE 44 DEGREES NORTH,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W76-12244

SHADOW LENGTH TABLES FOR LATITUDE 46 DEGREES NORTH,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W76-12245

SHADOW LENGTH TABLES FOR LATITUDE 48 DEGREES NORTH,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W76-12246

SHADOW LENGTH TABLES FOR LATITUDE 38 DEGREES NORTH,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W76-12247

SHADOW LENGTH TABLES FOR LATITUDE 40 DEGREES NORTH,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W76-12248

SHADOW LENGTH TABLES FOR LATITUDE 36 DEGREES NORTH,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W76-12249

REGIONAL SIMULATION OF STREAMFLOW DATA,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 2A.
W76-12250

A STOCHASTIC MODEL FOR PREDICTING THE PROBABILITY DISTRIBUTION OF THE DISSOLVED-OXYGEN DEFICIT IN STREAMS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5B.
W76-12276

DIGITAL MODEL TO PREDICT EFFECTS OF PUMPING FROM THE ARIKAREE AQUIFER IN THE DWYER AREA, SOUTHEASTERN WYOMING,
Geological Survey, Cheyenne, Wyo.
For primary bibliographic entry see Field 4B.
W76-12277

SURFACE WATER AVAILABILITY, PICKENS COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala.
For primary bibliographic entry see Field 4A.
W76-12280

GUIDE TO THE AVAILABILITY OF HYDROLOGIC DATA, GREATER PITTSBURGH REGION, PENNSYLVANIA.
Geological Survey, Harrisburg, Pa.
R. M. Beall.
Open-file report 76-352, May 1976. 12 p, 1 plate, 33 ref.

Descriptors: *Basic data collections, *Hydrologic data, *Sites, *Maps, *Pennsylvania, Precipitation(Atmospheric), Temperature, Streamflow, Gaging stations, Stage-discharge relations, Water quality, Surface waters, Groundwater, Water levels.
Identifiers: *Pittsburgh region(Pa).

Active primary-collection sites for hydrologic data are shown on a map of the Greater Pittsburgh region (Allegheny, Armstrong, Beaver, Butler, Washington, and Westmoreland Counties in southwestern Pennsylvania). The sources of data--by publication or responsible agency--are described. Secondary data collection sites have not been shown on the map, but several agencies involved in this activity have been listed. Hydrologic data are collected at the following numbers of identified sites under the auspices of Federal, State, and interstate organizations: Precipitation or temperature 39, surface-water stage or discharge 82, surface-water quality 69, and ground-water levels 7. (Woodard-USGS)
W76-12282

PROPOSED CROSS-FLORIDA BARGE CANAL: WATER-QUALITY ASPECTS, WITH A SECTION ON WASTE-ASSIMILATIVE CAPACITY,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5G.
W76-12283

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1970: PARTS 12-16. NORTH PACIFIC SLOPE BASINS, ALASKA, AND HAWAII AND OTHER PACIFIC AREAS.
Geological Survey, Reston, Va.
Available from the Supt. of Documents, GPO, Washington, DC 20402, Price $4.70. Water-Supply Paper 2160, 1976. 501 p, 1 fig.

Descriptors: *Water quality, *Surface waters, *Sediment transport, *Water temperature, *Pacific Northwest U.S., Alaska, Hawaii, Basic data collections, Water analysis, Chemical analysis, Water chemistry, Physical properties, Particle size, Streamflow, Sampling, Sites.
Identifiers: *North Pacific Slope basins.

During the water year ending September 30, 1970, the Geological Survey maintained 285 stations on 205 streams in the North Pacific Slope basins, Alaska, and Hawaii and other Pacific areas, for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 158 of these locations for chemical-Quality studies. Samples also were collected less frequently at many other points. Water temperatures were measured continuously at 235 and daily at 23 stations. Daily water temperatures were measured at most of the stations at the time samples were collected for chemical quality or sediment content. So far as practicable, the water temperatures were taken at about the same time each day. Quantities of suspended sediment are reported for 47 stations during the year ending September 30, 1970. Sediment samples were collected one or more times daily at most stations, depending on the rate of flow and changes in stage of the stream. Particle-size distributions of sediments were determined at 12 stations. The stream discharge reported for a composite sample is usually the average of daily mean discharges for the composite period. The discharges reported in the tables of single analyses are either daily mean discharges or discharges obtained at the time samples were collected and computed from a stage-discharge relation or from a discharge measurement. (Woodard-USGS)
W76-12284

DEVELOPING A STATE WATER PLAN: GROUND-WATER CONDITIONS IN UTAH, SPRING OF 1976,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 4B.
W76-12296

WATER-LEVEL CHANGES IN SOUTHWESTERN KANSAS, 1940-75,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 4B.
W76-12297

MAPS SHOWING GROUND-WATER CONDITIONS IN THE HARQUAHALA PLAINS AREA, MARICOPA AND YUMA COUNTIES, ARIZONA--1975,
Geological Survey, Tucson, Ariz.
E. E. Denis.
Water-Resources Investigations 76-33 (open-file report), April 1976. 3 sheets, 3 maps, 6 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water yield, *Water quality, *Maps, Water utilization, Irrigation, Water levels, Water level fluctuations, Water wells, Depth, Water table, Dissolved solids, Fluorides, *Arizona.
Identifiers: *Harquahala Plains area(Ariz), Maricopa County(Ariz), Yuma County(Ariz).

This 3-sheet map report describes ground-water hydrology and water quality in the Harquahala Plains area in Maricopa and Yuma Counties, Arizona. The map titles are: (1) Change in Water Level, December 1966 to January 1975, and Irrigated Area, 1974, (2) Well Depth and Depth to Water, 1975, and (3) Specific Conductance and

Fluoride Concentration, 1974. Deposits of high permeability and storage are discontinuous lenses of clay, silt, sand and gravel; the sand and gravel are the main water-yielding units. The deposits are from less than 300 feet thick near the mountain fronts to more than 1,200 feet thick in the central part of the area. Ground water generally is under water-table conditions but may be under artesian conditions in places. The long-term withdrawal of ground water has resulted in a general decline in water levels. Water-level declines for 1957-75 were more than 200 feet in all the wells in which depth to water was measured. In the Harquahala Plains area the dissolved-solids concentrations in ground water range from less than 500 to more than 800 mg/liter. (Woodard-USGS)
W76-12299

MAP OF OVERDIP SLOPES THAT CAN AFFECT LANDSLIDING IN ARMSTRONG COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
W. R. Kohl.
Available from Branch of Distribution, USGS 1200 S. Eads St. Arlington, VA 22202, $.75. Miscellaneous Field Studies Map MF-730, 1976. 1 sheet, 1 map, 8 fig, 1 tab, 8 ref.

Descriptors: *Landslides, *Slopes, *Maps, *Sites, *Pennsylvania, Erosion, Avalanches, Rock mechanics, Geology.
Identifiers: Armstrong County(Pa).

This map shows areas of overdip slopes in Armstrong County, Pa. A slope is 'overdip' where the hill slope is steeper than the inclination of the outcropping rock layers and both slope and layers dip in the same general direction. Symbolized on the map and accompanying explanation are overdip slopes where rock layers are inclined more than 40 feet per mile and areas where rock layers have a lesser degree of inclination or are horizontal. Not symbolized are areas where rock layers dipping more than 40 feet per mile crop out in flat land or on slopes that are not overdip. Localities typifying slope conditions are described. Overdip slopes are significant to the problem of landsliding because: (1) Jointed (fractured) rocks on an overdip slope have no built-in 'mechanical' resistance to downslope movement. (2) The dip of rock layers commonly causes groundwater to percolate to an overdip slope. Water may be the most significant factor in landsliding; the chief agent in lubrication and rock decomposition, as well as a contributor to weight of soil on the slope. The overdip-slope map is but one of a number of tools useful in defining areas where landslides may occur. Others include slope maps, geologic maps, and soil maps. (Woodard-USGS)
W76-12300

MESOSCALE SPATIAL AND TEMPORAL VARIATIONS OF WATER MASS CHARACTERISTICS IN THE CALIFORNIA CURRENT REGION OFF MONTEREY BAY IN 1973-1974,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 2L.
W76-12386

MESOSCALE COMPONENT OF THE GEOSTROPHIC FLOW AND ITS TEMPORAL AND SPATIAL VARIABILITY IN THE CALIFORNIA CURRENT OFF MONTEREY BAY IN 1973-74,
Naval Postgraduate School Monterey, Calif.
For primary bibliographic entry see Field 2L.
W76-12387

PLOT-DERIVED PARAMETERS FOR BASIN COMPUTATIONS,
Agricultural Research Service, Beltsville, Md. Hydrograph Lab.
For primary bibliographic entry see Field 2A.
W76-12438

ALLOWANCE FOR THE STOCHASTIC CHARACTER OF HYDROLOGICAL DATA IN WATER PROJECT DECISIONS,
National Water Authority, Budapest (Hungary). Engineering Secretariat.
For primary bibliographic entry see Field 7A.
W76-12439

A HIGH SIERRA PRECIPITATION MEASUREMENT PROGRAM, FINAL REPORT ON THE 1975 SEASON,
Atmospherics Inc., Fresno, Calif.
For primary bibliographic entry see Field 2B.
W76-12446

SATELLITE SNOW OBSERVATIONS AND SEASONAL STREAMFLOW FORECASTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 2C.
W76-12468

THE USE OF COMPUTER TECHNIQUES AND AUTOMATION FOR WATER RESOURCES SYSTEMS.
Economic Commission for Europe (UN), New York. Committee on Water Problems, Economic and Social Council.
For primary bibliographic entry see Field 6A.
W76-12535

PRESENT SITUATION AND TRENDS IN THE APPLICATION OF ADVANCED METHODS AND TECHNIQUES FOR WATER RESOURCES MANAGEMENT.
Economic Commission for Europe (UN), New York.
In: The Use of Computer Techniques and Automation for Water Resources Systems, Washington, D.C., 1974, Volume II. p 1-6. 8 ref.

Descriptors: *Water resources development, Computers, *Management, *Automation, Planning, Methodology, Design, Optimum development plans, Personnel, Economics, Social aspects, Europe, Operations, Forecasting, Monitoring, Water quality, River basins.

It is generally recognized that water resources management (as well as hydrology) is the least computerized of the physical sciences and technically advanced branches of industry. The existing lag in water management and automated control--explained in the past by the abundance, relative purity, and low cost of water in most industrialized countries--can no longer be justified today. The need to introduce computerized regional dispatching boards in regional control and management has been fully recognized in many ECE countries. This article considers some of the main points deemed important for the effective application of advanced techniques of management of water resources systems. Discussed are: (1) training of personnel for effective application of new tools of management; (2) planning and design of water resources systems with application of computers; (3) computerization and automation to rational operation of water resources systems; and (4) organization and institutional prerequisites for efficient application of computers and automation for water resources management. (See also W76-12535) (Bell-Cornell)
W76-12536

A QUANTITATIVE MODEL FOR THE PLANNING OF SURFACE WATER RESOURCES: USE OF MIXED VARIABLE LINEAR PROGRAMMING,
Ardour-Garonne Agency, Toulouse (France), Programming Group.
For primary bibliographic entry see Field 4A.
W76-12546

RIVER SYSTEM MODELLING FOR OPERATIONAL FORECASTING,
National Weather Service, Silver Spring, Md. Hydrologic Research and Development Lab.
For primary bibliographic entry see Field 4A.
W76-12550

USE OF OPTIMIZATION MODELS FOR WATER RESOURCES ALLOCATION AND CHOICE OF INVESTMENTS BY MEANS OF COMPUTERS,
Research and Design Inst. for Water Resources Engineering, Bucharest (Rumania). Water Economy Section.
For primary bibliographic entry see Field 6A.
W76-12558

USE OF INVESTMENT MODELS AND CHOICE OF ALTERNATIVE DECISIONS FOR THE OPTIMUM DISTRIBUTION OF WATER RESOURCES AT THE STAGE OF PLANNING BY MEANS OF COMPUTERS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
For primary bibliographic entry see Field 6A.
W76-12561

COMPUTER APPLICATION IN PROCESSING TECHNICAL AND ECONOMIC DATA FOR OPTIMIZING COMPLEX WATER RESOURCES SYSTEMS,
Belorussian Central Research Inst. for Water resources, Minsk.
For primary bibliographic entry see Field 6A.
W76-12565

FLOOD HAZARD ANALYSES FOR LOWER MARSH CREEK (INCLUDING SELECTED TRIBUTARIES), BANNOCK COUNTY, IDAHO.
Soil Conservation Service, Boise, Idaho.
For primary bibliographic entry see Field 4A.
W76-12580

CLARKS CREEK FLOOD PLAIN STUDY, CATAWBA COUNTY, NORTH CAROLINA.
Soil Conservation Service, Raleigh, N. C.
For primary bibliographic entry see Field 4A.
W76-12582

FLOOD HAZARD ANALYSES REPORT: EAST BRANCH NIMISHILLEN CREEK, STARK COUNTY, OHIO.
Soil Conservation Service, Columbus, Ohio.
For primary bibliographic entry see Field 4A.
W76-12586

MULTIPURPOSE COMPUTER FOR THE HONOLULU BOARD OF WATER SUPPLY,
Beck (R. W.) and Associates, Seattle, Wash.
For primary bibliographic entry see Field 4B.
W76-12589

FLOOD HAZARD INFORMATION: BACKLICK CREEK, VIOLET TOWNSHIP, FAIRFIELD COUNTY, OHIO.
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 4A.
W76-12592

FLOOD PLAIN INFORMATION: FRESHWATER CREEK, HUMBOLDT COUNTY, CALIFORNIA.
Army Engineer District, San Francisco, Calif.
For primary bibliographic entry see Field 4A.
W76-12593

FLOOD PLAIN INFORMATION: YELLOW RIVER, PART III, METROPOLITAN ATLANTA, GEORGIA.
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 4A.
W76-12595

8. ENGINEERING WORKS

8A. Structures

COASTAL ENGINEERING CONFERENCE. FOURTEENTH. PROCEEDINGS. COPENHAGEN, DENMARK, JUNE 24-28, 1974.
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 5G.
W76-12221

OCEAN 72, IEEE INTERNATIONAL CONFERENCE ON ENGINEERING IN THE OCEAN.
Institute of Electrical and Electronics Engineers, Inc., New York.
For primary bibliographic entry see Field 5G.
W76-12224

A STUDY OF THE EFFECTS OF STREAM CHANNELIZATION AND BANK STABILIZATION ON WARMWATER SPORT FISH IN IOWA: SUBPROJECT 5: EFFECTS OF LONGREACH STREAM CHANNELIZATION ON DISTRIBUTION AND ABUNDANCE OF FISHES,
Iowa Cooperative Fishery Unit, Ames.
For primary bibliographic entry see Field 4C.
W76-12230

A STUDY OF THE EFFECTS OF STREAM CHANNELIZATION AND BANK STABILIZATION ON WARMWATER SPORT FISH IN IOWA: SUBPROJECT 4: THE EFFECTS OF LONGREACH CHANNELIZATION ON HABITAT AND INVERTEBRATE IN SOME IOWA STREAMS,
Iowa Cooperative Fishery Unit, Ames.
For primary bibliographic entry see Field 4C.
W76-12231

A STUDY OF THE EFFECTS OF STREAM CHANNELIZATION AND BANK STABILIZATION ON WARMWATER SPORT FISH IN IOWA: SUBPROJECT NO. 3 SOME EFFECTS OF SHORT-REACH CHANNELIZATION ON FISH AND FISH FOOD ORGANISMS, IN CENTRAL IOWA WARM WATER STREAM,
Iowa Cooperative Fishery Unit, Ames.
For primary bibliographic entry see Field 4C.
W76-12232

A STUDY OF THE EFFECTS OF STREAM CHANNELIZATION AND BANK STABILIZATION ON WARMWATER SPORT FISH IN IOWA: SUBPROJECT 2. A STUDY OF THE IMPACT OF SELECTED BANK STABILIZATION STRUCTURES ON GAME FISH AND ASSOCIATED ORGANISMS,
Iowa Cooperative Fishery Unit, Ames.
For primary bibliographic entry see Field 4C.
W76-12233

A STUDY OF THE EFFECTS OF STREAM CHANNELIZATION AND BANK STABILIZATION ON WARM WATER SPORT FISH IN IOWA: SUBPROJECT 1 INVENTORY OF MAJOR STREAM ALTERATIONS IN IOWA,
Iowa Cooperative Fishery Unit, Ames.
For primary bibliographic entry see Field 4C.
W76-12234

STRUCTURAL MODEL STUDIES FOR THE HENDRIK VERWOERD DAM,
Wimpey (George) and Co. Ltd., Hayes (England). Wimpey Central Lab.
J. C. Chapman, B. Creber, and P. J. D. Guile.
The Institution of Civil Engineers, Proceedings, Part 2, Research and Theory, Vol 57, p 467-491, September 1974. 22 fig, 1 tab.

Descriptors: *Dams, *Model studies, *Structural models, *Stress analysis, Design, Behavior, Instrumentation, Spillways, Culverts, Gravity, Hydrostatic pressure.
Identifiers: Stress distribution.

The Hendrik Verwoerd Dam has a crest length of 3000 ft with a maximum height of 280 ft, and a storage capacity of 5 million acre feet. The main purpose of the model analysis was to determine the stress distribution in the control structures incorporated in the dam, but because it was found necessary to model the complete dam, much information was also obtained concerning the structural behavior of the dam at working load and at various overload conditions up to failure. The model was built of concrete to a scale of one to a hundred. Gravity load was applied within the body of the dam by vertical wires loaded by hydraulic jacks below the model. The behavior of the model dam under design load was satisfactory and the stresses were of the anticipated order of magnitude; the stresses showed good agreement with the results of a finite element analysis. The vertical tensile stresses in the spillway culvert walls were higher than those which had been estimated by simple calculation. This is due to the effect of the arch thrusts acting on the control structures and it was this effect that the model was particularly designed to study. The results of the model analysis indicated that substantial reinforcement was required in the walls between the spillway culverts to resist the tensile stresses. (Bell-Cornell)
W76-12523

8B. Hydraulics

PLANNING THE LOCATION AND CAPACITY OF FLOOD CONTROL STRUCTURES,
Cornell Univ., Ithaca, N. Y. Coll. of Engineering.
For primary bibliographic entry see Field 4A.
W76-12156

SUPERCRITICAL FLOW AT OPEN-CHANNEL JUNCTIONS; HYDRAULIC MODEL INVESTIGATION,
Army Engineer District, Los Angeles, Calif.
D. A. Barela.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 892, $6.75 in paper copy, $3.00 in microfiche. Report No. 2-100, July 1975. 161 p, 55 photo, 42 plate, 1 tab.

Descriptors: *Open channels, *Junctions, *Supercritical flow, *Model studies, Hydraulic models, Channels, Channel flow, Channel improvement, Turbulence, Waves(Water), Flow, Open channel flow, Structures, Drainage, Drainage systems, Storm drains, Civil engineering, Hydraulics, *California.
Identifiers: *Los Angeles area(Calif), Structure design.

Hydraulic model tests made to generalize and verify the hydraulic design of confluence structures are described. Model investigation of certain confluences showed unsatisfactory flow conditions involving considerable turbulence in the confluence structure and transverse waves in the channel downstream. Major changes in particular designs were effected. Various schemes were introduced in each case. Lengthening the transition downstream from divider wall and minimal angle of intersection of the two channels were found to be the most efficient solutions. (Sims - ISWS)
W76-12187

A LABORATORY EVALUATION OF TRASH RACKS FOR DROP INLETS,
Agricultural Research Service, Stillwater, Okla.
G. C. Hebaus, and W. R. Gwinn.
Technical Bulletin No. 1506, September 1975. 70 p, 76 fig, 24 tab, 2 ref, 1 append.

Descriptors: *Trash racks, *Hydraulic structures, *Hydraulic models, *Spillways, Intakes, Model studies, Laboratory tests, Prototype tests, Testing, Reservoirs, Evaluation, Detention reservoirs.
Identifiers: Drop inlets, Closed conduit spillways.

Performance tests for trash racks on closed-conduit spillways, using one-eighth-scale models, were developed and standardized by comparison with the performance of full-scale prototype structures mounted on a drop inlet to a 2-foot-diameter conduit. Flow data for use in spillway design were collected by testing models and prototypes of standard and experimental designs under a range of flow conditions, with clear water and standardized trash loads. The following recommendations were made: for two-way drop inlets in open water, there should be a rack with a solid plate and a solid skirt extending below the inlet crest level. Ventilation must be provided between the plate and skirt so that siphoning will not occur, unless such action is desired. If the vent is made by leaving an open space between the underside of the plate and the top of the skirt, this open space should be covered with mesh to prevent the entry of sticks. Rack bars should be placed in a plane sloping downward from the bottom edge of the skirt to the side of the drop inlet, to prevent rigid trash, floating alongside the drop inlet at low water, from rising with the water and entering the space between the skirt and the drop inlet side. The rack on the four-way square drop inlet performed well. However, if a rack of this type is used, a mesh-covered ventilation space between the skirt and the plate should be provided. The racks investigated in this study were generally best suited for open-water installations. (Humphreys - ISWS)
W76-12189

MASS TRANSPORT IN GRAVITY WAVES ON A SLOPING BOTTOM,
Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W76-12190

APPLICABILITY OF UNIT STREAM POWER EQUATION,
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 2J.
W76-12193

DISCHARGE PREDICTION, PRESENT AND FORMER, FROM CHANNEL DIMENSIONS,
Wisconsin Univ., Madison. Dept. of Geography.
For primary bibliographic entry see Field 2E.
W76-12198

THERMAL ANALYSIS OF FROZEN EMBANKMENT ISLANDS,
Puget Sound Naval Shipyard, Bremerton, Wash.
For primary bibliographic entry see Field 2L.
W76-12200

INCREASING THE MEAN CURRENT IN COASTAL CHANNELS,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
For primary bibliographic entry see Field 2L.
W76-12201

SEA LEVEL COMPUTATIONS OF THE BALTIC WITH A 20-CANAL MODEL,
Fishery Board of Sweden, Goteborg. Hydrographic Dept.
For primary bibliographic entry see Field 2L.

W76-12205

PROPOSED CROSS-FLORIDA BARGE CANAL: WATER-QUALITY ASPECTS, WITH A SECTION ON WASTE-ASSIMILATIVE CAPACITY,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5G.
W76-12283

FLOOD DISCHARGE OF STREAMS IN NEW MEXICO AS RELATED TO CHANNEL GEOMETRY,
Geological Survey, Albuquerque, N. Mex.
For primary bibliographic entry see Field 2E.
W76-12294

AN ANALYSIS OF THE NUMERICAL SOLUTION OF THE TRANSPORT EQUATION,
Princeton Univ., N. J. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W76-12434

INTERACTION OF WATER WAVES WITH CYLINDER BARRIER,
Polish Academy of Sciences, Gdansk. Inst. of Hydraulic Research.
S. R. Massel.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol. 102, No. WW2, Proceedings Paper 12125, p 165-187, May 1976. 11 fig, 23 ref, 5 append.

Descriptors: *Waves(Water), Hydrodynamics, *Drag, *Coastal structures, Coastal engineering, Analysis, Barriers, Equations, Mathematical studies, Pressure, Velocity.
Identifiers: *Wave forces, *Circular cylinders, Inertia, Mathematical analysis, Diffraction, Transmission coefficient.

The spatial periodic function was used in the investigation of the interaction of water waves with a row of evenly spaced vertical cylinders. The direction of the incident waves was arbitrary. The effect of the neighboring cylinders on the wave force on a given cylinder was derived. The equivalent mass coefficients were calculated. The theoretical results were compared with previous experimental results on the inertia-predominant wave force and on the transmission coefficient for the barrier. (Adams-ISWS)
W76-12441

WAVE FORCES ON VERTICAL CIRCULAR CYLINDER,
Chicago Bridge and Iron Co., Plainfield, Ill. Marine Research and Development.
S. K. Chakrabarti, A. L. Wolbert, and W. A. Tam.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol. 102, No. WW2, Proceedings Paper 12140, p 203-221, May 1976. 11 fig, 1 tab, 11 ref, 2 append.

Descriptors: *Hydrodynamics, *Drag, *Frequency, *Laboratory tests, Waves(Water), Analysis, Froude number, Reynolds number, Hydraulic similitude, Coastal structures, Model studies, Equations, Mathematical studies.
Identifiers: *Wave forces, Inertia, Lift, *Circular cylinders.

Tests were conducted at Reynolds numbers less than 30,000. Hydrodynamic parameters, inertia, drag, and lift coefficients were calculated from the measured force data. Coefficient values obtained for 1 ft sections were used to correlate the measured forces on the entire cylinder. The coefficients correlated well with the period parameter which followed the Froude scale. Resultant forces were found to be as much as 60% higher than the in-line force. Lift coefficients were calculated to the fifth harmonic as functions of the period parameter. The frequencies of the lift force were found to have a definite trend with the number of eddies formed, which depended on the period parameter. Dependence on the period parameter made scaling to other sizes straightforward except for uncertain effects from changing the Reynolds number from subscritical to supercritical. (Adams-ISWS)
W76-12443

THE DEPTH VS. DEPTH PLOT: AN AID TO SELECTING PIEZOMETER INSTALLATION DEPTHS IN BOREHOLES,
Piteau Gadsby Macleod Ltd. North Vancouver (British Columbia).
R. C. Dick.
Engineering Geology, Vol. 10, No. 1, p 37-42, May 1976. 5 fig, 2 ref.

Descriptors: *Depth, *Graphical methods, *Piezometers, *Boreholes, *Stability, Slope stability, Soil water, Soil pressure, Artesian aquifers, Water table, Permeability, Water pressure, Potentiometric level, Reservoir leakage, Water level fluctuations, Perched water, Groundwater.
Identifiers: Anomalies.

The location of the piezometric surface within a soil or rock mass is often the critical factor in stability analysis and in evaluations of reservoir water-tightness. Sealed piezometers are now almost universally used to measure water pressure within the mass. The location of these piezometers must be decided immediately upon completion of each borehole. A common aid to making this decision is a plot of borehole depth and borehole water level as functions of time. This paper introduced another way to evaluate the same data, with the borehole water depth plotted as a function of borehole depth. Anomalies can be detected more easily, and piezometers installed within these zones. Examples were given. (Visocky - ISWS)
W76-12447

ANALYTIC SOLUTIONS FOR DETERMINING NATURALLY FRACTURED RESERVOIR PROPERTIES BY WELL TESTING,
Instituto Mexicano del Petroleo, Mexico City.
A. O. de Swaan.
Society of Petroleum Engineers Journal, Vol. 16, No. 3, p 117-122, June 1976. 3 fig, 1 tab, 10 ref, append.

Descriptors: *Mathematical models, *Fracture permeability, *Oil reservoirs, *Compressible flow, Equations, Pressure, Drawdown, Hydraulic properties, Porosity, Flow, Graphical methods, Diffusivity, Porous media.
Identifiers: *Matrix blocks, Well testing.

A completely unsteady-state theory was developed that described the well pressure response of infinite, naturally fractured reservoirs of the type composed by high-permeability fractures and tight matrix blocks. The theory exclusively involved flow properties and dimensions of the fractures and the matrix blocks; no extra adjusting parameters were needed for predicting the pressure response of a reservoir with known properties. Comparison of computed pressure-drawdown theoretical curves with results of a numerical model applied to idealized reservoirs showed a good fit. It was concluded that an evaluation of the following reservoir properties is possible from well-test pressure plots: the fractures' kh product and the average product of the matrix porosity by a characteristic dimension of the matrix blocks. Thus, the model allowed comparison of well-test pressure response with the formation measurements. (Visocky - ISWS)
W76-12449

OPTIMIZATION OF DESIGN CAPACITY OF AN AQUEDUCT,
California Univ., Berkeley. Lawrence Berkeley Lab.
For primary bibliographic entry see Field 4A.
W76-12526

BAYESIAN APPROACH TO TILE DRAIN DESIGN,
Ecole Polytechnique Federale de Lausanne (Switzerland). Dept. of Agriculture.
A. Musy, and L. Duckstein.
Journal of the Irrigation and Drainage Division, Proceedings of the American Society of Civil Engineers, Vol 102, No IR3, p 317-334, September 1976. 7 fig, 3 tab, 30 ref.

Descriptors: *Tile drainage, *Land reclamation, *Decision making, Agricultural engineering, Design, Water management(Applied), Hydrology, Equations, Economics, Costs, Systems analysis, Methodology, Crops, Evaluation, Optimization, *Tile drains, Risks.
Identifiers: *Bayes theorem, *Decision theory, *Uncertainty principle, Systems engineering, Probability theory.

Economic and sociopolitical aspects of land reclamation in areas that necessitate drainage are combined with technical problems to yield a set of possible decisions, among which an optimum design is chosen. The loss or objective function is the sum of the expected damage caused by the submersion of given crops resulting from extreme rainfall events, and the initial cost of the reclamation. When the parameter uncertainty in the probability distribution function of extreme events is taken into account in the loss function, a Bayes risk function is obtained. The Bayes decision theoretic (BDT) approach consists of seeking a decision that minimizes the Bayes risk function. The BDT also evaluates the decision taken and compares the expected cost of delaying the construction to the worth of additional information resulting from such a delay. The practical example of an intensive agricultural system with different types of soils and crops illustrates the methodology. Crop loss functions and probability distributions of events are assumed on the basis of empirical observations. (Bell-Cornell)
W76-12527

PROFESSIONAL REQUIREMENTS OF MODERN WATER ENGINEERS INVOLVED IN RIVER BASIN MANAGEMENT UTILIZING CONTEMPORARY TOOLS,
Bureau of Reclamation, Sacramento, Calif. Mid-Pacific Regional Office.
For primary bibliographic entry see Field 4A.
W76-12537

DYNAMIC PROGRAMMING FOR DETERMINATION OF A STORM WATER OUTLET SYSTEM OF PIPES AND FLOOD-DAMPING DAMS,
Societe Grenobloise d'Etude et d' Applications Hydrauliques (France).
For primary bibliographic entry see Field 4A.
W76-12542

SEWER LAYING SYSTEM,
W. R. Brown.
United States Patent 3,956,901. Issued May 18, 1976. Official Gazette of the United States Patent Office, Vol. 946, No. 3, p 994, May, 1976. 1 fig.

Descriptors: *Patents, *Construction equipment, *Sewers, *Pipelines, *Tiles, Conduits, Conveyance structures, Engineering structures.

A patent for a tile carrying and service device used for laying sewer systems is described. The device consists of the following components: a chassis with wheels, pipe handling bays situated on each

side of the chassis, platforms in the pipe bays for support of the tiles, a means for conveying the tiles which are discharged transversely from the pipe bay platforms to a point distally from the chassis, a lift means for the platforms, and a means for discharging individual tiles from the pipe bays. (Kreager-FIRL)
W76-12605

WASTEWATER COLLECTION, (LITERATURE REVIEW),
Nottingham (H. D.) and Associates, Inc., McLean, Va.
For primary bibliographic entry see Field 5D.
W76-12631

8C. Hydraulic Machinery

WARM WATER STREAM ALTERATION IN IOWA: EXTENT, EFFECTS ON HABITAT, FISH, AND FISH FOOD, AND EVALUATION OF STREAM IMPROVEMENT STRUCTURES (SUMMARY REPORT),
Iowa Cooperative Fishery Unit, Ames.
For primary bibliographic entry see Field 4C.
W76-12235

TIDE-POWERED ELECTRICAL GENERATOR,
J. V. Rusby.
U. S. Patent No. 3,959,663, 4 p, 3 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 946, No 4, p 1886, May 25, 1976.

Descriptors: *Patents, *Energy conversion, *Energy transfer, *Tidal energy, *Tidal water, *Tidal powerplants, Engineering structures, Electric powerplants, Generators, Storage.
Identifiers: Jack bars, Weights.

A tide-powered electrical generator is described in which the energy from successive rising tides is stored in the form of potential energy for selective conversion to electricity. A float is constrained to vertical motion and it raises on successive tides a weight by means of a jack bar to reach a maximum predetermined height on a stable support structure where the weight is supported until release for the generation of electricity. Provision is made for the prevention of damage to the generator by excessive tidal rises. (Sinha - OEIS)
W76-12403

SUBMERSIBLE PUMPS UPGRADE SEWAGE HANDLING.
For primary bibliographic entry see Field 5D.
W76-12614

WASTEWATER COLLECTION, (LITERATURE REVIEW),
Nottingham (H. D.) and Associates, Inc., McLean, Va.
For primary bibliographic entry see Field 5D.
W76-12631

ALBUQUERQUE PLANT DESIGNED WITH COMPUTER IN MIND,
William Matotan and Associates, Albuerque, New Mex.
For primary bibliographic entry see Field 5D.
W76-12638

8D. Soil Mechanics

EFFECT OF SEEPAGE ON EMBANKMENT DEFORMATIONS DUE TO WATER LOADING,
Sydney Univ. (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-12188

ENGINEERING PROPERTIES OF COMPACTED CLAY CONDITIONED BY SATURATION AND FREEZE-THAW CYCLES,
Mobil Research and Development Corp., Dallas, Tex.
For primary bibliographic entry see Field 2C.
W76-12453

CASE STUDIES OF VARIATIONS IN SUBGRADE MOISTURE AND TEMPERATURE UNDER ROAD PAVEMENTS IN VIRGINIA,
Virginia Highway and Transportation Research Council, Charlottesville.
For primary bibliographic entry see Field 2C.
W76-12454

CAPACITANCE SENSOR FOR SOIL MOISTURE MEASUREMENT,
State Univ. of New York at Buffalo.
For primary bibliographic entry see Field 2G.
W76-12457

NUCLEAR MAGNETIC RESONANCE SENSORS FOR MOISTURE MEASUREMENT IN ROADWAYS,
Southwest Research Inst., San Antonio, Tex.
For primary bibliographic entry see Field 2G.
W76-12458

DETERMINATION OF DISPERSIVE CLAY SOIL ERODIBILITY BY USING A PHYSICAL TEST,
Texas Univ. at Arlington.
For primary bibliographic entry see Field 2G.
W76-12460

8E. Rock Mechanics and Geology

THE DEPTH VS. DEPTH PLOT: AN AID TO SELECTING PIEZOMETER INSTALLATION DEPTHS IN BOREHOLES,
Piteau Gadsby Macleod Ltd. North Vancouver (British Columbia).
For primary bibliographic entry see Field 8B.
W76-12447

8F. Concrete

PAVEMENT CRACKING IN WEST TEXAS DUE TO FREEZE-THAW CYCLING,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2C.
W76-12452

EVALUATION OF PAVEMENT DRAINAGE SYSTEMS MADE OF LAYERS OF OPEN-GRADED BITUMINOUS AGGREGATE MIXTURES,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
S. D. Tayabji, and E. J. Barenberg.
In: Frost, Moisture, and Erosion; Transportation Research Record 532, Transportation Research Board, National Research Council, Washington, D. C., p 49-63, 1975. 5 fig, 10 tab, 10 ref.

Descriptors: *Road construction, *Paving, *Permeability, Roads, Highways, Bituminous materials, Drainage, Subsurface drainage, Laboratory tests, Soils, Clays, Soil properties, Civil engineering *Illinois.
Identifiers: *Pavements, Pavement drainage.

This study was aimed at evaluating the performance of pavement drainage systems in Illinois constructed with locally available aggregate sources. The study was limited to investigating the use of open-graded, hot-mixed bituminous aggregate mixtures in pavement drainage systems. A preliminary investigation was carried out in the laboratory to evaluate the permeability and the stability of the open-graded bituminous aggregate mixtures. Specimens were prepared according to the procedures in ASTM D1559. Permeability tests (in which a constant-head test that allowed the measurement of permeability at low heads was used) and stability tests were performed on the same specimen. From the results of the preliminary investigations, six test pavements incorporating different design concepts were tested at the University of Illinois test track. Dynamic loading was applied to the test pavements, and water was passed through the open-graded bituminous aggregate drainage layers to simulate surface and lateral infiltration. Permeability tests at a constant head were carried out regularly on the pavement test sections. The progress of rutting in the test pavements was also recorded. Results of these limited tests indicated that open-graded bituminous aggregate mixtures possess a high order of permeability and that care must be taken to prevent the migration of subgrade fines into these aggregate layers if satisfactory drainage is to be achieved. This paper discussed methods that can be used to ensure satisfactory performance of pavements made of open-graded aggregates. (See also W76-12451) (Sims-ISWS)
W76-12456

8G. Materials

HYGIENIC AND TOXICOLOGICAL EVALUATION OF SOME GRADES OF RUBBER USED IN DOMESTIC WATER SUPPLY SYSTEMS, (IN RUSSIAN),
Municipal Sanitary-Epidemiological Center, Moscow (USSR).
For primary bibliographic entry see Field 5C.
W76-12252

EVALUATING A LOW-ENERGY, HIGH-VOLUME PUMP FOR ODOR REDUCTION FROM LIVESTOCK WASTE LAGOONS BY MIXING,
Oklahoma State University, Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W76-12344

FROST, MOISTURE, AND EROSION.
Transportation Research Board, Washington, D. C.
For primary bibliographic entry see Field 2G.
W76-12451

EVALUATION OF PAVEMENT DRAINAGE SYSTEMS MADE OF LAYERS OF OPEN-GRADED BITUMINOUS AGGREGATE MIXTURES,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8F.
W76-12456

WATER SUPPLIES FROM ULSTER VALLEY GRAVELS,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
For primary bibliographic entry see Field 4B.
W76-12524

ANTHRACITE ACTIVATED CARBONS: MANUFACTURE AND APPLICATIONS,
For primary bibliographic entry see Field 5D.
W76-12658

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

OUTDOOR RECREATION PLANNING AND RESEARCH IN THE U.S.A.,
National Foundation for Scientific Research (NFWO), Ghent (Belgium).
For primary bibliographic entry see Field 6B.
W76-12585

9D. Grants, Contracts, and Research Act Allotments

1973-1974 SALINE WATER CONVERSION SUMMARY REPORT.
Office of Saline Water, Washington, D. C.
For primary bibliographic entry see Field 3A.
W76-12343

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

CONTINUATION OF THE ARIZONA WATER INFORMATION SYSTEM (AWIS),
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 10D.
W76-12216

10C. Secondary Publication And Distribution

A REVIEW OF LITERATURE ON THE USE OF POTASSIUM PERMANGANATE (KMN04) IN FISHERIES,
Bureau of Sport Fisheries and Wildlife, Fayetteville, Ark. South Central Reservoir Investigations.
For primary bibliographic entry see Field 5C.
W76-12335

CHEMICALS AND ALLIED PRODUCTS (LITERATURE REVIEWS),
Union Carbide Corp., South Charleston, W. Va.
For primary bibliographic entry see Field 5D.
W76-12412

PETROLEUM PROCESSING WASTES, (LITERATURE REVIEWS),
Weston (Roy F.), Inc., West Chester, Pa.
For primary bibliographic entry see Field 5D.
W76-12415

URBAN RUNOFF AND COMBINED SEWER OVERFLOW, (LITERATURE REVIEW),
Environmental Protection Agency, Edison, N.J. Wastewater Research Div.
For primary bibliographic entry see Field 5D.
W76-12627

MICROBIOLOGY OF WASTE TREATMENT, (LITERATURE REVIEW),
Pennsylvania State Univ., University Park.
For primary bibliographic entry see Field 5D.
W76-12628

WASTEWATER TREATMENT - PHYSICAL AND CHEMICAL METHODS, (LITERATURE REVIEW),
Massachusetts Univ., Amherst. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W76-12629

SLUDGE TREATMENT, UTILIZATION, AND DISPOSAL, (LITERATURE REVIEW),
Delaware Univ., Dept. of Civil Engineering. Newark.
For primary bibliographic entry see Field 5D.
W76-12630

LAGOONS AND OXIDATION PONDS, (LITERATURE REVIEW),
Black and Veatch, Kansas City, Mo.
For primary bibliographic entry see Field 5D.
W76-12671

MIXING AND TRANSPORT, (LITERATURE REVIEW),
Argonne National Lab., Ill. Energy and Environmental Systems Div.
For primary bibliographic entry see Field 5B.
W76-12672

BIOLOGICAL FILTERS, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5D.
W76-12674

10D. Specialized Information Center Services

CONTINUATION OF THE ARIZONA WATER INFORMATION SYSTEM (AWIS),
Arizona Univ., Tucson. Office of Arid Lands Studies.
K. E. Foster, and K. J. DeCook.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 560, $4.50 in paper copy, $3.00 in microfiche. Completion Report, (1975). 48 p, 2 tab, 6 ref, 4 append. OWRT A-031-ARIZ(2). 14-31-0001-5003.

Descriptors: *Data processing, *Data storage and retrieval, *Hydrologic data, Information retrieval, *Systems analysis, *Arizona, Information exchange, Water quality, Water supply, Groundwater, Watersheds(Basins), Data collections.
Identifiers: *Arizona Water Information System.

The Arizona Water Information System (AWIS) was developed for storage and retrieval of water resources data and for dissemination of water resources information pertaining to the State of Ariz. Collectively, the AWIS system contains a number of distinct elements. The Activity File is a listing of water resource activities and projects dating from 1961, which can be accessed by keywords or by agency to retrieve abstracts and information on approximately 1,000 projects; the file recently was updated and additional projects covered in a regional program pertaining to the Lower Colo. River Basin portions of Ariz., Calif., and Nev. A bimonthly Ariz. Water Resources News Bulletin and a companion Project Information Bulletin were initiated under this project and will be continued as a cooperative effort of the Ariz. Water Commission and the Univ. of Ariz. Water Resources Research Center and Office of Arid Lands Studies. A cassette-tape pilot series on Ariz. water trends also was produced and evaluated for use potential, which appears favorable. A western state conference on water information dissemination, sponsored by this project and the Office of Water Research and Technology, was held in Phoenix in 1973, to discuss the above kinds of activities in the several states and the possibilities for cooperative regional activities. The capacity for interactive hydrologic data processing, utilizing the DEC-10 computer system at the Univ. of Ariz., was developed in 1974 with the support of the Ariz. Water Commission (AWC). Groundwater and quality-of-water data furnished by AWC have been stored progressively in the system, and are retrievable by remote terminal through telephone hookup, by quarter-township grid location or by drainage basin.
W76-12216

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